MILNE'S PROGRESSIVE ARITHMETICS

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PROGRESSIVE ARITHMETIC

FIRST BOOK

BY

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FIRST PROG. ARITH.

E-P 13

PREFACE

THIS book is designed to cover the first four years of arithmetic. In many of our largest and best schools the instruction of the first year and a half or two years of the course is given orally. In such schools the matter found in Part I may be omitted, but inasmuch as this is a thorough and complete review of the instruction usually given during the first two years, it may be used as a text during the first part of the third year, or even earlier. The instruction for the third year is given in Part II, and for the fourth year in Part III.

The amount of work that may be accomplished in a half year has been taken as the unit of classification, and within that unit the various subjects have been treated *topically* though, of course, not exhaustively. With this order of presentation it is believed that the most satisfactory results may be obtained.

Abundant and varied practice, both oral and written, is given in order to secure accuracy and facility in computation, and the method of development is such that the pupil cannot fail to gain an intelligent comprehension of all the processes that are presented. The presentation always proceeds by very easy and progressive steps from the known to the related unknown.

The large number of exercises and problems will be a welcome relief to teachers who have been under the necessity of

devising and preparing a great amount of supplementary work. It is generally conceded that supplementary exercises are not only burdensome for the teacher, but usually unsatisfactory as to results, because of the great waste of time for both teacher and pupil.

Yet the book is not merely a book of exercises. Each new concept is carefully presented by questions designed to bring to the understanding of the pupil the ideas he should grasp, and then his knowledge is applied. The formal statement of principles and definitions is, however, reserved for a later stage of the pupil's progress.

The problems have been prepared with much care. They have been made both rational and practical, and they relate to a wide range of subjects drawn from modern life and industries. The several types of problems form a continuous graded series throughout the book. They have been classified as scientifically as the abstract work.

It is believed that the book will be found interesting to children, because the study of numbers is made interesting by easy progressive steps and by thorough and satisfactory drills.

WILLIAM J. MILNE.

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PROGRESSIVE ARITHMETIC

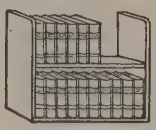
FIRST BOOK

PART I

READING AND WRITING NUMBERS

1. 1. Count the windows in this room. Count the desks in the first row; the books in this bookcase; the children in your class.

How far can you count?



2. Write the numbers to ten, using words and figures.

One	two	three	four	five	six	seven	eight	nine	ten
1	2	3	4	5	6	7	8	9	10

3. Ten and one are **eleven**, written **11**; ten and two are **twelve**, written **12**; ten and three are **thirteen**, **13**; ten and four are **fourteen**, **14**; ten and five are **fifteen**, **15**.

4. Write the word and the figures that stand for ten and six, the number of books in the case; for ten and seven; for ten and eight; for ten and nine.

2. 1. The figure **0** stands for **nothing**. It is called **naught**, or **zero**. Thus, 10 means one ten and no ones.

2. Two tens are **twenty**, written **20**, which means 2 tens and 0 ones; three tens, **thirty**, **30**; four tens, **forty**, **40**; five tens, **fifty**, **50**.

3. Write the word and the figures that stand for six tens; for seven tens; for eight tens; for nine tens.

4. Ten tens are **one hundred**, written **100.**

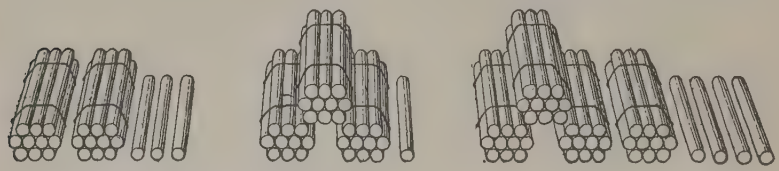
3. 1. 11 means 1 ten and 1 one; 12 means 1 ten and 2 ones; 13 means 1 ten and 3 ones.

2. In the same way, tell what 14 means; 15; 16; 17; 18; 19; 20.

3. 21 means 2 tens and 1 one; 22 means 2 tens and 2 ones.

4. In the same way tell what each of these numbers means: 23, 24, 25, 26, 29, 30, 31, 40, 44, 56, 60, 85.

5. Each of these bundles of sticks contains ten sticks. How many sticks are there in each group of tens and ones?



6. Copy and fill blanks:

FIGURES	MEANING	NAME
46	4 tens and 6 ones	Forty-six
62	—— and ——	——
39	—— and ——	——
50	5 tens and 0 ones	Fifty
80	—— and ——	——
90	—— and ——	——
99	—— and ——	——
100	10 tens and ——	One hundred

7. Read each number and tell what it means:

27	38	40	56	67	98	53	48
32	70	57	28	20	63	81	100

8. Write in figures, placing ones under ones and tens under tens:

Three tens and five ones.	Seventy-one.
Forty-five.	Ninety-nine.
Twenty-two.	Sixty.
Six tens and two ones.	Eighty-four.
Seventy-nine.	Thirty-three.
Thirty-six.	Nineteen.
Seven tens.	Seventy-two.
Five tens and nine ones.	Eighty-nine.

9. Observe that *the first figure, counting from the right, stands for ones, and the second figure stands for tens.*

4. 1. How many cents is a dime worth? How many cents are 2 dimes worth? 3 dimes? 5 dimes? 10 dimes?

10 cents equal 1 dime.
100 cents, or 10 dimes, equal 1 dollar.

2. A dime and a cent are worth how many cents? 1 dime and 5 cents? 2 dimes and 5 cents? 6 dimes and 3 cents?

3. The sign ¢ stands for cents; $ for dollars.

Thus, 57¢ means 57 cents; $57 means 57 dollars.

4. Read: 45¢, 38¢, 17¢, $6, $25, $88, 60¢, $90.

5. Write: sixteen cents, forty cents, sixty dollars.

ADDITION

5. 1. How many balls are 5 balls and 7 balls?

2. How many lemons are 9 lemons and 6 lemons?

3. How many are 7 and 5? 8 and 3 and 5?

4. You have been uniting two or more numbers into one number.

This process is called **addition.**

5. Here is a short way of writing "4 and 2 are 6":

$$4+2=6.$$

6. The sign + means **and.** It is called **plus.**

The sign = means **are** or **equal** (sometimes **is** or **equals**). It is called the **sign of equality.**

7. Copy, complete, and read:

$4+5=$	$9+5=$	$6+6=$	$3+2+4=$
$7+3=$	$8+4=$	$4+5=$	$1+5+3=$

8. Numbers to be *added* are usually written like this with the result below:

$$\begin{array}{r} 4 \\ 2 \\ \hline 6 \end{array}$$

The result is called the **sum.**

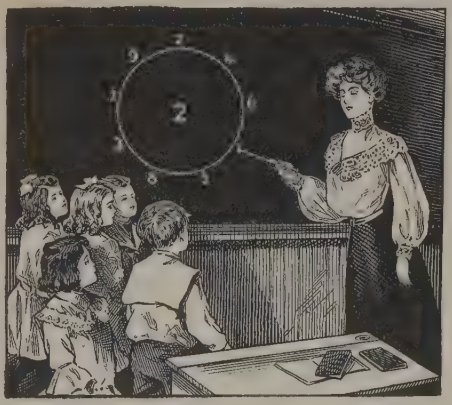
EXERCISES

6. Add quickly, naming only the sum:

1.	1	7	3	7	4	8	2	5	3
	1	4	2	5	6	9	8	6	9
2.	3	2	5	6	2	6	4	8	7
	3	1	5	9	4	8	1	7	9

3.	8	3	2	1	4	6	1	7	9
	8	5	2	3	4	6	5	7	2
4.	6	8	5	8	3	4	7	6	5
	3	4	2	1	7	9	2	1	9
5.	1	7	8	5	1	2	4	5	9
	9	6	3	4	7	6	3	8	9

These boys and girls are adding 2 to each number around the ring.



6. Begin at 1 and see how quickly you can go around the ring in either direction, adding 2 to each number *without making a mistake.*

Begin at 3 and go in either direction. Begin at 2; at other numbers.

7. Instead of 2 put 3 in the ring and add as before; put 4 in the ring and add; then 5; 6; 7; 8; 9.

8. Clara picked 9 yellow asters and 8 red ones. How many asters did she pick?

9. Guy had 9 melons in his school garden. Paul had 7 more than Guy. How many had Paul?

10. Sarah pressed 6 autumn leaves and Julia pressed 9 more than Sarah did. How many leaves did Julia press?

EXERCISES

7. Add, giving results instantly:

1.

1	11	21	31	41	51	61	71	81	91
6	6	6	6	6	6	6	6	6	6

Add 1 instead of 6; then add 2; 3; 4; 5; 7; 8.

2.

2	12	22	32	42	52	62	72	82	92
4	4	4	4	4	4	4	4	4	4

Add 2 instead of 4; then add 1; 3; 5; 6; 7.

3.

3	13	23	33	43	44	54	64	74	84
2	2	2	2	2	2	2	2	2	2

Add 3 instead of 2; then add 1; 4; 5; 6; 7; 8; 9.

4.

5	15	25	35	45	46	56	66	76	86
5	5	5	5	5	5	5	5	5	5

Add 6 instead of 5; then add 1; 2; 3; 4; 7; 8; 9.

5.

7	17	27	37	47	48	58	68	78	88
4	4	4	4	4	4	4	4	4	4

Add 2 instead of 4; then add 1; 3; 5; 6; 7; 8; 9.

6.

9	19	29	39	49	59	69	79	89	49
8	8	8	8	8	8	8	8	8	8

Add 1 instead of 8; then add 2; 3; 4; 5; 6; 7; 9.

EXERCISES

8. 1. In this diagram, add the three numbers in each of three columns, or *vertical* rows; in each of three *horizontal* rows; in each of two *slanting* rows.

1	6	7
8	5	2
4	9	3

2. See how rapidly you can find these eight sums *without making a mistake.*

Practice with the numbers changed about.

Add rapidly:

3.

4	8	7	5	2	5	8	8
7	4	5	8	8	9	7	8
3	6	5	2	6	6	8	8

Add upward and test your result by adding downward:

4.

1	1	2	3	5	6	8	7
5	4	3	6	8	9	3	6
3	6	4	7	3	0	9	7
2	8	5	4	7	9	1	9

5.

5	4	4	7	9	4	5	9
1	1	3	8	3	7	3	9
2	5	5	0	8	9	0	9
1	2	9	3	8	5	7	9
2	8	6	8	2	8	9	9

6. On Halloween a boy paid 4¢ for a mask, 8¢ for a wig, and 5¢ for a horn. How much did he pay for all ?

7. Draw on paper 6 horizontal lines, 8 vertical lines, 6 slanting lines, and 7 more vertical lines. How many lines have you drawn altogether?

8. A postman left 4 letters at Mr. Brown's house, 4 at Mr. Ward's, 8 at Mr. Joy's, 5 at Mr. Clark's, and 6 at Mr. Boyd's. How many did he deliver to all?

9. 1. How many ones are 5 ones and 2 ones? How many tens are 5 tens and 2 tens? Write 5 tens.

Add rapidly:

2.	4 tens	40	20	30	10	20	50	60
	3 tens	30	10	20	40	20	30	20
3.	30	20	60	40	80	40	20	50
	40	50	30	40	10	20	70	50
4.	35	43	75	20	40	30	16	27
	40	30	20	42	55	65	50	70

WRITTEN EXERCISES

1. Add 24 and 63.

$$\begin{array}{r} 24 \\ 63 \\ \hline 87 \end{array}$$

How many ones are 3 ones and 4 ones? Write the sum of the ones under the ones. How many tens are 6 tens and 2 tens? Write the sum of the tens under the tens. How do you read 8 tens and 7 ones? What, then, is the sum of 24 and 63? Tell what you did to find the sum.

Add:

2. 16	3. 33	4. 38	5. 62	6. 45
22	14	11	35	24
7. 31	8. 43	9. 15	10. 58	11. 17
46	34	24	20	32

Add upward and test your answer by adding downward:

12. 62	13. 41	14. 33	15. 14	16. 22
13	26	32	52	23
13	12	33	21	33
17. 10	18. 21	19. 12	20. 22	21. 26
11	23	3	33	40
12	24	50	2	12
13	30	4	30	21

WRITTEN EXERCISES

10. 1. If the Glenwood baseball club played 24 games at home and 15 away from home, how many games did it play?

MODEL SOLUTION

24 games (at home)
15 games (away from home)
39 games (the number played)
24 games + 15 games = 39 games.

2. A conductor rang up 22 fares on one trip and 26 on another. How many did he ring up on both trips?

3. Charles has 54 cents in his bank, and Edward has 14 cents more than Charles. How much money has Edward?

4. At a party there were 17 boys and 22 girls. How many children were there at the party?

5. A boy sold 16 morning papers and 33 evening papers. How many papers did he sell that day?

6. Stephen has 44 rare stamps, and Henry has 23 more than Stephen. How many stamps has Henry?

7. If 33 boys rode to a picnic in one car and 36 in another, how many rode in both cars?

Add and test each result:

8.	9.	10.	11.	12.
16¢	72 boys	45 guns	24 balls	4 bats
42¢	13 boys	10 guns	40 balls	33 bats
31¢	3 boys	32 guns	12 balls	41 bats

13.	14.	15.	16.	17.
$23	35 girls	43 pins	14 dolls	26 bags
14	2 girls	24 pins	13 dolls	30 bags
50	62 girls	11 pins	12 dolls	13 bags

In examples like 13, the sign $ is written only with the first number and the answer.

18. Mary has ironed 22 towels, 11 napkins, and 5 handkerchiefs. How many pieces has she ironed?

19. George spent 14¢ for a bat, 25¢ for a ball, and 40¢ for a glove. How much did all cost?

20. A boy had 35¢ left after spending 50¢ for a fishing rod and 11¢ for hooks and lines. How much money had he at first?

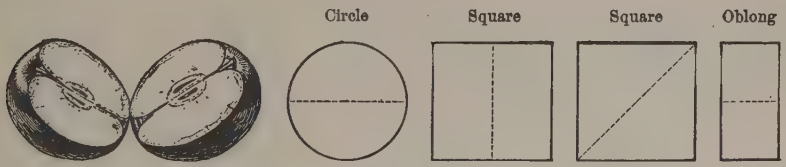
21. Grace spent 20¢ for bananas, 12¢ for grapes, 22¢ for nuts, and 24¢ for figs. How much did all cost?

22. On flag day I counted the flags on four buildings. There were 21, 13, 23, and 20. How many flags did I count?

23. How much did Ella's party cost, if her expenses were 10¢ for lemons, 6¢ for sugar, 20¢ for cake, and 40¢ for ice cream?

HALVES AND FOURTHS

11. 1. Into how many parts is the apple divided? the circle? each square? the oblong?



2. How do the two parts of the apple compare in size? the parts of the circle? of each square? of the oblong?

3. Make a circle, two squares, and an oblong, out of paper. Fold each paper to find the line that divides it into *two* equal parts and cut along this line.

4. One of the *two equal* parts of anything is called **one half** of it.

5. Show one half of the circle; one half of each square; one half of the oblong. Show two halves of each.

6. Draw a line and divide it into halves. What do you do to anything to get one half of it?

7. What part of each of these circles is shaded? What part is light?

8. How many halves of a circle are there in one circle?

9. To how many circles are two halves of any circle equal? four halves of equal circles?

10. One half is written $\frac{1}{2}$; two halves, $\frac{2}{2}$.

12. 1. Divide an apple into halves; divide each half into two equal parts. Do the same with a circle; with two squares; with an oblong.

2. Into how many equal parts has each object been divided?

3. One of the *four equal* parts of anything is called **one fourth**, or **one quarter** of it.

4. Make a paper oblong, and by folding divide it into halves and then into quarters.

Do the same with a paper circle.

5. How would you cut a pie into quarters?

6. What part of a pie is one half of one half of it?

7. How many fourths of a pie make one half of the pie?

8. Draw a line and divide it into fourths. Show one fourth of it; two fourths; three fourths

9. What part of the first square is shaded? How many fourths are light?

10. How many fourths of the second square are shaded? how many are light?

11. One fourth is written $\frac{1}{4}$; two fourths, $\frac{2}{4}$.

12. Write three fourths; four fourths.

EXERCISES

13. Using a cent piece, mark and cut out some paper circles. Fold and cut some of them into halves, others into quarters.

1. On a sheet of paper paste 1 whole circle; then enough half circles to make 1 whole circle; then enough quarter circles to make 1 whole circle. Compare them thus:

1 circle = 2 half circles = 4 quarter circles.

1 = 2 halves = 4 fourths.

1 = $\frac{2}{2}$ = $\frac{4}{4}$.

Using parts of circles as in exercise 1, show that

2. $\frac{1}{2}$ = —— fourths. $\frac{1}{2}$ = ——.

3. $\frac{1}{2}+\frac{1}{4}$ = —— fourths. $\frac{1}{2}+\frac{1}{4}$ = ——.

4. Complete and show with circles and parts of circles:

$\frac{1}{2}+\frac{1}{2}=$ $\frac{2}{4}+\frac{2}{4}=$ $\frac{2}{4}+\frac{1}{4}=$ $\frac{3}{4}+\frac{1}{4}=$

TELLING TIME

14. 1. Write with figures the numbers from 1 to 12.

2. The Romans used letters for these numbers:

1	2	3	4	5	6	7	8	9	10	11	12
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII

3. We often find these Roman numbers on the face of a clock, except that there the number four is written IIII, instead of IV.

Read the numbers on the clock face.

4. To what number is the long hand of this clock pointing?

The long hand is called the *minute hand.*

5. To what number is the short hand of the clock pointing?

The short hand is called the *hour hand.*

6. By this clock it is nine o'clock.

To what number will the hour hand be pointing at ten o'clock? at six o'clock? at three o'clock?

7. When the minute hand has passed from XII to III, it has passed over one quarter of the clock face.

The hour hand has moved a little past IX.

It is then a quarter past nine o'clock.

8. When the minute hand has passed from XII to VI, it has passed over one half of the clock face.

The hour hand has moved halfway from IX to X.

It is then half past nine o'clock.

9. When the minute hand has reached VI, how many quarter hours have passed since nine o'clock?

When the minute hand has reached IX, how many quarter hours have passed since nine o'clock?

The hour hand is then near X.

How many more quarters of the clock face will the minute hand have to move over *before* it gets to XII?

When the minute hand is at IX and the hour hand is near X, we say it is "*a quarter before ten,*" or "*a quarter to ten,*" instead of "three quarters past nine."

10. When the hour hand is at X and the minute hand is at XII, what time is it?

15. 1. How long does it take the minute hand to move over the face of the clock?

2. How long does it take the hour hand to move from IX to X? from X to XI? from XI to XII?

3. How many half hours are there in an hour?

4. How many quarter hours are there in an hour?

5. How many quarter hours are there in a half hour?

6. Read the time shown on each of these clock faces.

7. Draw the face of a clock, the hands showing a quarter past ten; half past ten; a quarter to eleven; half past one; a quarter to eight.

8. Jessie's bedtime is half past eight. One night she sat up half an hour later. At what time did she go to bed?

9. Mary starts for school at a quarter to nine. Sarah lives farther away and starts a quarter of an hour earlier. At what time does Sarah start for school?

MEASURING LIQUIDS

16. 1. The smallest measure holds just **one pint** and is called a **pint measure**.

2. Fill it with water and empty it into the next larger measure. Is the larger measure full?

Do the same thing again. Is the larger measure full now?

3. Tell how many pints of water there are in it.

4. The larger measure holds *two pints*, or **one quart**, and is called a **quart measure**.

5. How many pints of water equal a quart of water?

6. How many pints of milk equal a quart of milk?

Two pints equal one quart.
2 pt. = 1 qt.

We write pt. for pint or pints; qt. for quart or quarts.

17. 1. Fill the quart measure with water and empty it into the largest measure.

Do this several times until you have filled the largest measure.

2. How many quarts of water have you poured into it?

3. The largest measure holds *four quarts*, or **one gallon** and is called a **gallon measure.**

4. How many quarts of water equal a gallon of water?

Four quarts equal one gallon.
4 qt. = 1 gal.

18. 1. Pour a pint of water into the quart measure. Notice how far up the water is in the quart measure. One pint is what part of one quart?

2. Pour two quarts of water into the gallon measure. Two quarts are what part of a gallon?

3. Pour out one quart of the water. What part of a gallon remains?

4. How many quarts are there in $\frac{3}{4}$ of a gallon?

EXERCISES

19. 1. Roy has poured 2 qt. of water into the pail shown in the picture, John 1 qt., and Elsie 1 qt.

If each pours in another quart, how many quarts will there be in the pail? how many quarts more than a gallon? how many quarts less than 2 gallons?

2. If each again pours in 1 qt. and this fills the pail, how many quarts of water does the pail hold?

3. Measure any pitchers, basins, jars, or other dishes that you may have.

4. How many pints are 2 qt. and 1 pt.? How many quarts are 1 gal. and 3 qt.? $\frac{3}{4}$ of a gallon and 2 qt.?

5. Stella's mother bought 3 pt. of milk one day, 2 pt. the next, and 4 pt. the next. How much milk did she buy in the three days?

6. A woman had a jug containing 2 gal. of vinegar. After she had put in 3 qt. more, how many quarts were in it?

SUBTRACTION

20. 1. How many more cars are 9 cars than 4 cars?
Which is more, 8 or 10? 7 is how many more than 5?

2. How many cents are 8 cents less 5 cents?
How many are 10 less 4? 9 less 7? 8 less 3?

3. You have been finding the *difference* between two numbers, or taking part of a number from it and finding how many are *left*.

These processes are called **subtraction**.

4. Here is a short way of writing "8 less 3 are 5":

$$8-3=5.$$

5. The sign $-$ means **less**. It is called **minus**.

6. Copy, complete, and read:

$9-5=$	$7-3=$	$10-5=$	$8-8=$
$6-3=$	$8-5=$	$9-3=$	$7-2=$

7. The numbers are often written like this with the result below:

$$\begin{array}{r} 8 \\ 3 \\ \hline 5 \end{array}$$

The result is called the **difference**, or **remainder**.

EXERCISES

21. Subtract quickly:

1.	6	3	10	15	6	14	5	7	16
	3	1	5	9	4	8	1	7	9
2.	5	4	8	16	2	8	14	18	6
	5	2	5	8	2	4	7	9	5
3.	2	11	5	4	10	17	3	11	12
	1	4	2	4	6	9	3	6	9
4.	8	4	10	12	9	15	6	13	12
	8	3	8	5	2	7	6	8	6
5.	9	12	7	1	10	13	8	7	14
	3	4	2	1	7	9	7	1	9
6.	10	13	9	11	9	8	7	9	11
	9	6	1	3	4	6	3	9	2

7. Edward had 14 chickens, but a fox caught 5 of them. How many chickens were left?

8. Nora had 10 windows to wash. After she had finished 3 of them, how many had she to wash?

9. Twelve things equal a **dozen**. There were a dozen lilies in a pond, and Gertrude picked 4 of them. How many were left?

10. Draw a dozen rings on the board, and rub out 7. How many are left?

11. Mrs. Case baked a dozen rolls for dinner, and the family ate all but 3 of them. How many rolls were eaten?

12. How old are you? In how many years shall you be 11 years old?

13. Ella has read 9 pages of a story 18 pages long. How many pages has she yet to read?

14. Henry counted 17 wild ducks in a pond. When 8 of them flew away, how many were left?

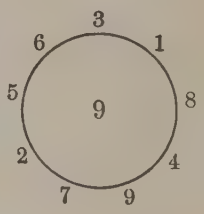
15. A farmer had 16 turkeys. If he sold 9 of them at Thanksgiving time, how many did he have left?

16. There were 14 persons that took dinner at Frank's house Thanksgiving Day and 8 at Helen's. How many more dined at Frank's than at Helen's?

EXERCISES

22. 1. Subtract, *correctly* and *rapidly*, each number around the ring from the number within, beginning with 3 and going in either direction.

Begin with 8; with 5; with 6; with other numbers.



2. Put 10 in the ring instead of 9 and subtract the numbers outside as in exercise 1.

3. Put 11 in the ring and subtract the numbers outside; put 12 in the ring and subtract; then 13; 14; 15; 16; 17; 18; 19.

Subtract, giving results instantly:

4. 19 29 39 49 59 69 79 89 99
1 1 1 1 1 1 1 1 1

Subtract 2 instead of 1; then 3; 4; 5; 6; 7; 8; 9.

5. 10 20 30 40 50 60 70 80 90
2 2 2 2 2 2 2 2 2

Subtract 1 instead of 2; then 3; 4; 5; 6; 7; 8; 9.

6. 17 27 37 47 58 68 78 88 98
7 7 7 7 7 7 7 7 7

Subtract 1 instead of 7; then 2; 3; 4; 5; 6; 8; 9.

7. 11 21 31 41 52 62 72 82 92
8 8 8 8 8 8 8 8 8

Subtract 1 instead of 8; then 2; 3; 4; 5; 6; 7; 9.

8. 13 23 33 43 54 64 74 84 94
7 7 7 7 7 7 7 7 7

Subtract 1 instead of 7; then 2; 3; 4; 5; 6; 8; 9.

9. 15 25 35 45 56 66 76 86 96
6 6 6 6 6 6 6 6 6

Subtract 1 instead of 6; then 2; 3; 4; 5; 7; 8; 9.

23. Subtract rapidly:

1	5 tens	50	30	60	40	30	70	80
	2 tens	20	10	40	10	20	50	40
2.	50	90	80	70	90	60	80	100
	30	60	30	20	30	50	10	70
3.	55	65	75	96	36	52	91	87
	30	40	50	70	20	40	50	60

WRITTEN EXERCISES

1. From 97 subtract 52.

97
52
45

How many ones are 7 ones less 2 ones?
Write the difference of the ones under the ones.
How many tens are 9 tens less 5 tens?
Write the difference of the tens under the tens.

What, then, is the difference between 97 and 52?
Tell what you did to find the difference.

Test. — The answer when added to 52 should give 97.

Subtract, and test each result:

2. 33	3. 63	4. 48	5. 82	6. 66
21	42	35	51	33
7. 46	8. 75	9. 87	10. 98	11. 85
34	53	22	44	24
12. 57	13. 89	14. 44	15. 79	16. 88
25	76	14	27	36

Subtract and test:

17. 45 22	18. 85 33	19. 53 23	20. 99 76	21. 45 34
22. 66 34	23. 58 27	24. 68 34	25. 84 31	26. 77 27
27. 79 45	28. 91 61	29. 57 45	30. 79 56	31. 63 31
32. 37 26	33. 88 45	34. 85 44	35. 67 17	36. 76 43

WRITTEN EXERCISES

24. 1. Mr. Hale had $86 in the bank and drew out $25. How much money had he left in the bank?

MODEL SOLUTION

$86 (in the bank at first)
$25 (drawn out)
$61 (left in the bank)

$86 − $25 = $61, for $25 + $61 = $86.

2. There are 34 badges in a box. If 21 belong to John and the rest to Earl, how many does Earl own?

3. I have 28 cherries. If I give 14 of them to Clara and the rest to Grace, how many cherries will Grace have?

4. There are 43 rooms in the Bayside Hotel. When 30 of them have been swept, how many more are there to sweep?

5. Frank printed 36 photographs and gave away 22 of them. How many had he left?

6. A horse dealer had 64 horses and sold 40 of them. How many horses had he left?

7. Mary had 78 cents and spent 25 cents for the use of a rowboat. How much money had she left?

8. Frank has 63¢ and wishes to buy a wagon costing 75¢. How much more money does he need?

9. A man had 32 electric lamps and bought enough more so that he had 48. How many did he buy?

10. A girl went to the grocery store with 87¢ in her purse. She spent all but 35¢. How much did she spend?

11. If there are 34 girls and 22 boys in a class, how many more girls are there than boys?

12. Harry is 14 years old, and his uncle is 37 years old. How much older is Harry's uncle than Harry?

13. If John has 44¢ and Beatrice has 67¢, how much less money has John than Beatrice?

14. If you blow 38 soap bubbles and I blow 23, how many more soap bubbles do you blow than I?

15. Mary's mother paid 15¢ for cheese and 38¢ for butter. How much less did she pay for cheese than for butter?

16. At a fair a peddler sold 48 red balloons and 26 blue ones. How many more red balloons did he sell than blue ones?

THIRDS AND SIXTHS

25. 1. Into how many equal parts has Ruth cut the cake?

2. One of the *three equal* parts of anything is called **one third** of it.

3. If Ruth cuts each piece into two equal pieces, into how many equal pieces will the cake then be cut?

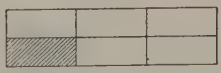
4. One of the *six equal* parts of anything is called **one sixth** of it.

5. How many sixths of a cake are there in one third of a cake? What part of a cake is one half of one third of it?

6. Draw a line and divide it into thirds; into sixths.

7. What part of the first oblong is light? How many thirds are shaded?

8. What part of the second oblong is shaded? How many sixths are light?



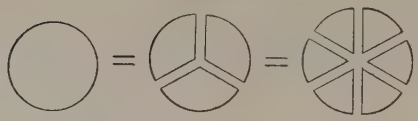
9. How many thirds of an oblong are there in one oblong? how many sixths?

10. How many sixths of this oblong are shaded? how many are light?

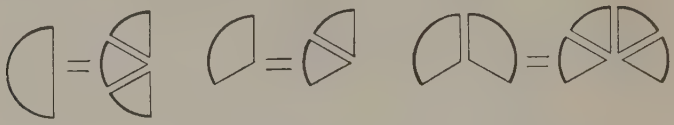
11. One third is written $\frac{1}{3}$; one sixth, $\frac{1}{6}$.

12. Write two thirds; three sixths; five sixths; six sixths.

EXERCISES



26. 1. How many thirds of a circle are there in one circle? how many sixths?



2. How many sixths are there in $\frac{1}{2}$? in $\frac{1}{3}$? in $\frac{2}{3}$?

3. If I divide an orange into thirds and give 1 third to John, how many thirds do I have left? $1-\frac{1}{3}=$ ——.

4. If I then give 1 third to William, how many thirds do I give to both boys? $\frac{1}{3}+\frac{1}{3}=$ ——.
How many thirds do I have left? $1-\frac{2}{3}=$ ——.

5. Floy gave $\frac{1}{6}$ of a pie to Ruth and $\frac{1}{6}$ to Jane. How many sixths of it did she give away? $\frac{1}{6}+\frac{1}{6}=$ ——.
How many sixths were left? $1-\frac{2}{6}=\frac{6}{6}-\frac{2}{6}=$ ——.
To how many thirds are $\frac{2}{6}$ equal? $\frac{4}{6}$?

6. Floy gave $\frac{1}{6}$ of the pie to George. How many sixths had she then given away? $\frac{1}{6}+\frac{1}{6}+\frac{1}{6}=$ ——.
How many were left? $1-\frac{3}{6}=\frac{6}{6}-\frac{3}{6}=$ ——.
To how many halves are $\frac{3}{6}$ equal?

7. $\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}=$ ——.

8. $1-\frac{4}{6}=$ ——.

9. $\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}=$ ——.

10. $1-\frac{5}{6}=$ ——.

MEASURING LENGTH

27. 1. Examine your rule. Notice the long marks that are numbered.

Notice the distance between two of these marks.

2. This length is called **one inch.**

3. Using your rule to measure, draw on the board a line twelve inches long.

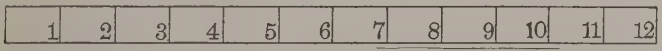
4. This length is called **one foot.**

5. How many inches are there in one foot?

Twelve inches equal one foot.
12 in. = 1 ft.

6. Count the inches on your rule. How long is it?

28. 1. Make a paper rule one foot long, and mark the inches on it as shown in this drawing, which is made smaller than a foot rule.



2. Fold the rule, bringing the ends together. How many inch spaces are there in each half of the rule?

$\frac{1}{2}$ of 1 foot = ——— inches.

3. Fold the rule again and find how many inches there are in one fourth of a foot.

$\frac{1}{4}$ of 1 foot = ——— inches.

4. Count the inches in two fourths of a foot; in three fourths of a foot.

5. How many fourths of a foot make one half of a foot?

6. Make another paper rule and fold it at the 4-inch and 8-inch marks.

What part of a foot is 4 inches? How many thirds of a foot are 8 inches?

7. Taking the rule as it is now folded, fold it again in the middle. What part of a foot is $\frac{1}{2}$ of $\frac{1}{3}$ of a foot?

Count the inches in $\frac{1}{6}$ of a foot; in $\frac{3}{6}$ of a foot.

How does $\frac{3}{6}$ of a foot compare with $\frac{1}{2}$ of a foot?

We may write "$\frac{1}{2}$ of a foot" in a short way like this: $\frac{1}{2}$ ft. What does $\frac{1}{4}$ ft. mean? $\frac{1}{3}$ ft.? $\frac{1}{2}$ qt.? $\frac{1}{4}$ gal.?

EXERCISES

29. 1. Without measuring, draw a line as nearly 1 ft. long as you can. Test it by measuring with a rule. How many inches too long or too short is your line?

2. In the same way draw a line $\frac{1}{2}$ ft. long and test your estimate; $\frac{1}{4}$ ft. long; $\frac{1}{3}$ ft. long; 2 in. long.

3. Estimate the length of your desk. Measure it.

4. Estimate the width of the door; the width of the window. Test your estimates by measuring.

5. Estimate and measure the length, width, and height of the table; the length and width of your pencil box.

6. Estimate how much wider your copy book is than this book. Test by measuring.

7. Is this book more or less than $\frac{1}{2}$ ft. wide? $\frac{1}{3}$ ft.? $\frac{1}{4}$ ft.? How many inches more or less in each case?

8. Which is longer and how much, a 7-inch line or one $\frac{2}{3}$ ft. long? an 8-inch line or one $\frac{3}{4}$ ft. long?

30. 1. Draw a line one foot long on the blackboard; extend it a foot; extend it another foot.

How many feet long is the whole line now?

2. This length is called **one yard.**

3. How many feet are there in a yard?

Three feet equal one yard.
3 ft. = 1 yd.

4. What things are measured by the yard?

31. 1. Draw a 1-yard line and mark it off into feet. What part of 1 yard is 1 foot? 2 feet?

2. Measure and count the inches in $\frac{1}{3}$ yd.; in $\frac{2}{3}$ yd.

12 in. + 12 in. = —— in.

3. Measure and count the inches in $\frac{3}{3}$ yd., or in 1 yd.

12 in. + 12 in. + 12 in. = —— in.

4. How many inches are $\frac{1}{3}$ of 36 in.? $\frac{2}{3}$ of 36 in.?

EXERCISES

32. 1. How many yards long do you think the schoolroom is? how wide? Measure to see.

2. Estimate, in yards, the length of each blackboard in the room. Test your estimate by measuring.

3. Draw a line $2\frac{1}{2}$ ft. long and another 1 yd. long. Which is shorter? how many inches shorter?

4. Take a string 1 yd. long and cut it in the middle. Measure one piece and compare it with a 2-foot line. Which is longer, and how many inches longer?

PARTS OF GROUPS

33. 1. If 6 pears are separated into *two* equal groups, how many are in each group?

2. What part of the pears is in each group? How many pears are $\frac{1}{2}$ of 6 pears?

3. Separate 6 pears into *three* equal groups. How many pears are $\frac{1}{3}$ of 6 pears? $\frac{2}{3}$ of 6 pears?

4. Take 12 splints. Separate them into 2 equal groups. How many splints are $\frac{1}{2}$ of 12 splints?

5. Separate them into 3 equal groups. How many splints are $\frac{1}{3}$ of 12 splints? $\frac{2}{3}$ of 12 splints?

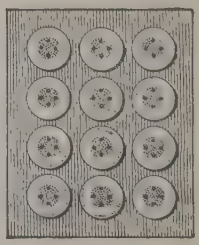
6. Separate them into 4 equal groups. How many splints are $\frac{1}{4}$ of 12 splints? $\frac{2}{4}$ of 12 splints? $\frac{3}{4}$ of 12?

7. By properly grouping the splints, find $\frac{1}{6}$ of 12. How many are $\frac{2}{6}$ of 12? $\frac{3}{6}$ of 12? $\frac{4}{6}$ of 12? $\frac{5}{6}$ of 12?

IIII IIII IIIII IIIII III III III II II II II

8. What is $\frac{1}{2}$ of 8? $\frac{1}{2}$ of 10? $\frac{1}{3}$ of 9? $\frac{1}{4}$ of 8?

9. What part of a dozen buttons are 3 buttons? 6 buttons? 9 buttons?



10. What part of a dozen buttons are 4 buttons? 8 buttons?

11. How many buttons are there in $\frac{1}{2}$ of a dozen buttons? in $1\frac{1}{2}$ dozen? in $\frac{1}{4}$ dozen? in $1\frac{3}{4}$ dozen?

NUMBERS TO FIFTY

34. Counting by twos.

1. Count the boys in this procession by *twos*.

2. Count them in such a way as to tell how many *times* you have counted two boys, thus: "*One* 2 is 2; *two* 2's are 4; *three* 2's are 6;" and so on.

3. How many boys are two times 2 boys? three times 2 boys? Continue to ten times 2 boys.

4. How many pints are there in 1 quart? in 2 qt.? in 3 qt.?

5. In 4 quarts there are 4 times 2 pints, or 8 pints. Tell in the same way how many pints there are in 5 qt.; in 6 qt.; in 7 qt.; in 8 qt.; in 9 qt.; in 10 qt.

6. Instead of the word "**times**" the sign × is used.

7. This is the **table of twos** to 10 times 2.

Copy it; then commit it **to memory.**

$1 \times 2 = 2$	$6 \times 2 = 12$
$2 \times 2 = 4$	$7 \times 2 = 14$
$3 \times 2 = 6$	$8 \times 2 = 16$
$4 \times 2 = 8$	$9 \times 2 = 18$
$5 \times 2 = 10$	$10 \times 2 = 20$

35. 1. If 4 boys march by twos, how many twos will there be? How many 2's are there in 4?

2. How many 2's are there in 6? in 8? in 10? in 12? in 14? in 16? in 18? in 20?

3. How many times can 2 apples be taken out of this basket, if it contains 12 apples? if it contains 14 apples? 16 apples? 18 apples? 20 apples?

4. Count by twos to 20, and as you name each number tell how many times it contains 2, thus: "2 contains 2 *once;* 4 contains 2 *two* times;" etc.

5. Another way to say "12 contains 2 six times" is to say "12 divided by 2 is equal to 6."

In writing we use the sign ÷ for "**divided by.**"

Thus, $12 \div 2 = 6$ means "12 contains 2, 6 times," or "12 divided by 2 is equal to 6."

6. Read, filling blanks:

4 times 2 = 8; 8 contains 2 —— times.
5 times 2 = 10; 10 contains 2 —— times.
6 times 2 = 12; 12 contains 2 —— times.
10 times 2 = 20; 20 contains 2 —— times.

$2 \div 2 =$	$6 \div 2 =$	$10 \div 2 =$	$14 \div 2 =$	$18 \div 2 =$
$4 \div 2 =$	$8 \div 2 =$	$12 \div 2 =$	$16 \div 2 =$	$20 \div 2 =$

7. 6 = 3 twos, || || ||; $\frac{1}{3}$ of 6 is ——.
8 = 4 twos, || || || ||; $\frac{1}{4}$ of 8 is ——.

8. Find $\frac{1}{2}$ of 4; $\frac{1}{3}$ of 3; $\frac{2}{3}$ of 6; $\frac{3}{4}$ of 8; $\frac{1}{6}$ of 12.

EXERCISES

36. Here are ten columns of 2's. The number of 2's in each column is written at the top. Copy on the blackboard.

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
2	2	2	2	2	2	2	2	2	2
	2	2	2	2	2	2	2	2	2
		2	2	2	2	2	2	2	2
			2	2	2	2	2	2	2
				2	2	2	2	2	2
					2	2	2	2	2
						2	2	2	2
							2	2	2
								2	2
									2

1. Add the columns in this way: "One 2 is 2, two 2's are 4," etc. Also add in this way: "Once 2 is 2, two times 2 are 4," etc. Do this rapidly.

2. Name the sums only, as rapidly as you can, as the teacher points to various columns.

3. Beneath each column write its sum. Which column shows 6 divided into 3 equal parts?

Tell about the column thus:

"3 times 2 are 6; $\frac{1}{3}$ of 6 is 2; 6 contains 2, 3 times."

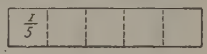
4. Tell about the column whose sum is 4; 8; 12; 20.

5. Which column shows 8 divided into 4 equal parts? How many 2's are there in $\frac{1}{4}$ of 8? in $\frac{3}{4}$ of 8? $\frac{3}{4}$ of 8 = ——.

6. In the same way find $\frac{2}{3}$ of 6; $\frac{2}{6}$ of 12; $\frac{5}{6}$ of 12.

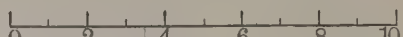
7. Count the parts of this oblong. How do they compare?

8. One of the *five equal* parts of anything is called **one fifth** of it.



One fifth is written $\frac{1}{5}$.

9. || || || || ||



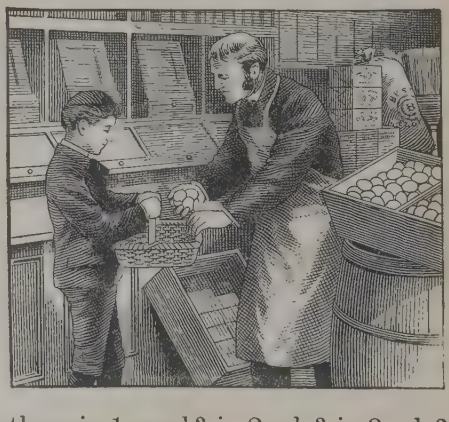
10 = —— 2's. $\frac{1}{5}$ of 10 = ——.

10. Answer quickly:

2+2+2=	5×2=	14÷2=	$\frac{1}{2}$ of 4=
2 is $\frac{1}{3}$ of —	2 is $\frac{1}{5}$ of —	18÷2=	$\frac{2}{3}$ of 6=
4×2=	$\frac{1}{6}$ of 12=	$\frac{1}{4}$ of 8=	$\frac{1}{5}$ of 10=
2 is $\frac{1}{4}$ of —	12÷2=	$\frac{3}{4}$ of 8=	$\frac{5}{6}$ of 12=

37. Counting by threes.

1. Albert is buying 30 eggs. The grocer is putting them into the basket three at a time. Count for Albert by threes to 30.



2. Count to 30 thus: "*One* 3 is 3; *two* 3's are 6;" and so on.

3. How many eggs are 2 times 3 eggs? 3×3 eggs? 4×3 eggs? 5×3 eggs? Continue to 10×3 eggs.

4. How many feet are there in 1 yard? in 2 yd.? in 3 yd.?

5 In 4 yards there are 4 times 3 feet, or —— feet. Tell in this way how many feet there are in 5 yd.; in 6 yd.; etc.

6. Memorize this table of threes.

$1 \times 3 = 3$	$6 \times 3 = 18$
$2 \times 3 = 6$	$7 \times 3 = 21$
$3 \times 3 = 9$	$8 \times 3 = 24$
$4 \times 3 = 12$	$9 \times 3 = 27$
$5 \times 3 = 15$	$10 \times 3 = 30$

7. How many times 3 is 6? Answer in this way: "6 is 2 times 3."

How many times 3 is 9? 12? 15? 18? 21?

8. Read, filling blanks:

8 times 3 = 24; 24 contains 3 —— times.

9 times 3 = 27; 27 contains 3 —— times.

10 times 3 = 30; 30 contains 3 —— times.

$3 \div 3 =$	$9 \div 3 =$	$15 \div 3 =$	$21 \div 3 =$	$27 \div 3 =$
$6 \div 3 =$	$12 \div 3 =$	$18 \div 3 =$	$24 \div 3 =$	$30 \div 3 =$

9. 6 = 2 threes, III III; $\frac{1}{2}$ of 6 is ——.

10. Find $\frac{1}{4}$ of 8; $\frac{1}{4}$ of 12; $\frac{1}{3}$ of 6; $\frac{1}{2}$ of 6; $\frac{1}{3}$ of 9; $\frac{1}{5}$ of 10; $\frac{1}{5}$ of 15; $\frac{1}{6}$ of 12; $\frac{1}{6}$ of 18.

11. Compare 2×3 with 3×2

38. Counting by fours.

1. Write these columns of 4's and others, increasing in height until the tallest contains ten 4's. Under each column write its sum.

			4
		4	4
	4	4	4
4	4	4	4

2. Read the sums in this way:

"*One* 4 is 4; *two* 4's are 8;" and so on to ten 4's.

3. Suppose that each 4 stands for 4 quarts, or 1 gallon. How many quarts are there in 3 gallons? in 4 gal.? in 5 gal.? in 6 gal.? in 7 gal.? in 8 gal.? in 9 gal.? in 10 gal.?

4. Memorize this **table of fours.**

$1 \times 4 = 4$	$6 \times 4 = 24$
$2 \times 4 = 8$	$7 \times 4 = 28$
$3 \times 4 = 12$	$8 \times 4 = 32$
$4 \times 4 = 16$	$9 \times 4 = 36$
$5 \times 4 = 20$	$10 \times 4 = 40$

5. How many 4's are there in 8? in 12? in 16? in 20? in 24? in 28? in 32? in 36? in 40?

6. Copy, complete, and read:

$4 \div 4 =$	$12 \div 4 =$	$20 \div 4 =$	$28 \div 4 =$	$36 \div 4 =$
$8 \div 4 =$	$16 \div 4 =$	$24 \div 4 =$	$32 \div 4 =$	$40 \div 4 =$

7. Look at your columns of 4's, and their sums, and tell what part 4 is of 8; of 12; of 16; of 20; of 24.

8. Find $\frac{2}{3}$ of 12; $\frac{3}{4}$ of 16; $\frac{1}{5}$ of 20; $\frac{1}{6}$ of 24; $\frac{5}{6}$ of 24.

9. What part of a gallon is 1 quart? 2 qt.? 3 qt.?

10. What part of a dozen is 4? How do you know?

11. Compare 2×4 with 4×2; 3×4 with 4×3.

EXERCISES

39. 1. Tell quickly the value of each of the following:

4×3	7×2	$14 \div 2$	$30 \div 3$	$\frac{1}{5}$ of 15
5×2	8×4	$15 \div 3$	$32 \div 4$	$\frac{1}{6}$ of 12
4×4	6×3	$16 \div 2$	$40 \div 4$	$\frac{1}{5}$ of 20
6×2	10×2	$18 \div 2$	$\frac{1}{3}$ of 6	$\frac{3}{4}$ of 8
5×4	8×3	$18 \div 3$	$\frac{1}{4}$ of 8	$\frac{2}{3}$ of 12
7×3	9×4	$24 \div 3$	$\frac{1}{3}$ of 12	$\frac{5}{6}$ of 12
8×2	10×4	$24 \div 4$	$\frac{1}{4}$ of 12	$\frac{1}{6}$ of 18
5×3	$8 \div 4$	$27 \div 3$	$\frac{1}{5}$ of 10	$\frac{2}{3}$ of 9
6×4	$12 \div 2$	$28 \div 4$	$\frac{1}{4}$ of 16	$\frac{3}{4}$ of 16

2. Compare 8 and 2 thus: 8 is 4 times 2; 2 is $\frac{1}{4}$ of 8.

Compare in the same two ways:

3. 6 and 2.
4. 6 and 3.
5. 12 and 4.
6. 12 and 3.
7. 12 and 2.
8. 15 and 3.
9. \$16 and \$4.
10. 10¢ and 2¢.
11. 18 hr. and 3 hr.

40. Counting by fives.

1. Let us keep tally while the coal man carries in the coal.

We will make one mark for each bag emptied, drawing every fifth mark across the preceding four, thus: 𝍸.

2. When the tally is 𝍸 𝍸, how many bags have been emptied? How many are two 5's, or 2×5?

3. Show the tally for three 5's, for four 5's, and so on to ten 5's, telling each time how many bags it stands for.

4. What is the value of 2 five-cent coins? of 3 such coins? of 4? of 5? of 6? of 7? of 8? of 9? of 10?

5. Memorize this **table of fives.**

$1 \times 5 = 5$	$6 \times 5 = 30$
$2 \times 5 = 10$	$7 \times 5 = 35$
$3 \times 5 = 15$	$8 \times 5 = 40$
$4 \times 5 = 20$	$9 \times 5 = 45$
$5 \times 5 = 25$	$10 \times 5 = 50$

6. How many 5's are there in 10? in 15? in 20?

Tell how many times each of these numbers contains 5: 25, 30, 35, 40, 45, 50.

7. Copy, complete, and read:

$5 \div 5 =$	$15 \div 5 =$	$25 \div 5 =$	$35 \div 5 =$	$45 \div 5 =$
$10 \div 5 =$	$20 \div 5 =$	$30 \div 5 =$	$40 \div 5 =$	$50 \div 5 =$

8. A **half dollar** is worth 50 cents, and a **quarter dollar** 25 cents. How many five-cent pieces is each worth?

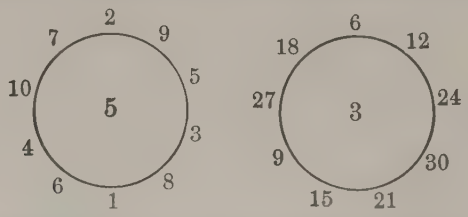
9. What part of 20¢ is 5¢? Find $\frac{1}{4}$ of 20¢; $\frac{3}{4}$ of 20¢.

10. Find $\frac{1}{5}$ of 25; $\frac{2}{5}$ of 25; $\frac{2}{3}$ of 15; $\frac{1}{6}$ of 30; $\frac{5}{6}$ of 30.

11. Compare 2×5 with 5×2; 3×5 with 5×3; 4×5 with 5×4.

EXERCISES

41. 1. The first circle is for drill on the table of 5's. Give the results *rapidly*, beginning with 2 5's and going in either direction. Begin with other numbers around the circle.



2. How rapidly can you go around the first circle when the number inside is 2? 3? 4?

3. How many 3's are there in each number around the second circle? Give the results *rapidly*.

4. How many 4's are there in each of these numbers:

4, 12, 20, 8, 40, 36, 28, 16, 12, 24?

5. How many times do these numbers contain 5:

5, 15, 35, 45, 25, 10, 20, 30, 40, 50?

REVIEW

EXERCISES

42. 1. Count these dots by 4's; by 2's; by 5's; by 10's. You should get the same answer each time.

2. Count by 2's from 0 to 50, thus: 0, 2, 4, 6, etc.

3. Count by 3's from 0 to 60; by 4's from 0 to 80; by 5's from 0 to 100; by 10's from 0 to 100.

4. Count by 2's from 1 to 49, thus: 1, 3, 5, 7, etc.

5. Count by 3's from 1 to 58; from 2 to 59.

6. Count by 4's from 1 to 77; from 2 to 78; from 3 to 79.

7. Count by 5's from 1 to 96; from 2 to 97; from 3 to 98; from 4 to 99.

8. Count by 10's from 1 to 91; from 2 to 92; etc.

9. Carrie bought 7 cents' worth of plums at 3 for a cent. How many plums did she buy?

10. At 3 plums for a cent, how many cents would she have needed to buy 30 plums? 24 plums?

11. When milk costs 4 cents a quart, how much must be paid for a gallon at the same rate? for 6 qt.?

How many quarts can you buy for 20 cents? for 32 cents? for 28 cents? for 36 cents?

12. When you have read 4 pages more, what will be your page number?

Add or subtract as the signs indicate:

13. $21+8$	14. $39-6$	15. $72+5$	16. $58-5$
17. $\begin{array}{r} 42 \\ +7 \\ \hline \end{array}$	18. $\begin{array}{r} 58 \\ -3 \\ \hline \end{array}$	19. $\begin{array}{r} 81 \\ +8 \\ \hline \end{array}$	20. $\begin{array}{r} 64 \\ +5 \\ \hline \end{array}$
21. $\begin{array}{r} 77 \\ -20 \\ \hline \end{array}$	22. $\begin{array}{r} 61 \\ +30 \\ \hline \end{array}$	23. $\begin{array}{r} 29 \\ +50 \\ \hline \end{array}$	24. $\begin{array}{r} 99 \\ -60 \\ \hline \end{array}$

25. When lemons cost 2 cents each, how much will 3 lemons cost? half a dozen lemons? 5 lemons? 8 lemons? 10 lemons?

26. When Ella had set 10 toy cups and saucers on her table, how many dishes were there on it?

27. How many lemons costing 2 cents each can you buy for 10 cents? for 14 cents? for 8 cents? for 18 cents?

28. When milk costs 5 cents a quart, how much will 3 quarts of milk cost? a gallon? $\frac{1}{2}$ gal.? 2 gal.? How many quarts can you buy for 20 cents? for 35 cents?

29. Jennie has 20 cents. How many 5-cent measures of peanuts can she buy? how many 4-cent measures?

30. How much money do you need to buy 5 3-cent bags of pop corn? 4 bags? 7 bags? 9 bags?

31. Three boys sold lemonade and earned $9, which they divided equally. How much money did each receive?

32. How much do 3 roses cost at 4 cents each? 4 roses? 6 roses? 10 roses? At this price, how many roses can you buy for 20 cents? for 32 cents? for 28 cents?

33. Find the sum of 50 cents and 25 cents.

34. How many inches are there in 1 foot and 6 inches?

35. Robert picked 9 chestnut burs and found 2 chestnuts in each. How many chestnuts did he find in all?

36. Eva made 45 penwipers for a fair but only 25 were sold. How many were left?

37. In a game of prisoner's base there were 12 children free on one side and 10 on the other, and 7 were prisoners on the bases. How many children were playing?

38. Ralph caught 9 fish, 3 of which were trout. What part of Ralph's fish were trout?

39. What part of a dozen fish did Ralph catch?

40. John has 72 cents in his bank. If he puts in 5 cents and then 2 cents, how much money will then be in the bank?

41. On election night there were 16 bonfires on Main St. and 12 on Maple St. How many bonfires were there on both streets?

42. When oil costs 12 cents a gallon, how much will a quart of oil cost?

A quart is $\frac{1}{4}$ of a gallon.
A quart of oil will cost $\frac{1}{4}$ of 12 cents, or —— cents.

43. When tarts cost 20 cents a dozen, how much will 3 tarts cost at the same rate?

44. When molasses costs 14 cents a quart, how much will a pint of molasses cost?

MEASURING WEIGHT

43. 1. What are these children doing? For what are the weights used? Point to the smallest weight.

It is called an **ounce weight**, for it weighs **one ounce**.

2. Point to the largest weight.

It weighs as much as *sixteen* of the ounce weights, or **one pound**, and is called a **pound weight**.

3. How many ounces are there in a pound?

Sixteen ounces equal one pound.
16 oz. = 1 lb.

4. The weight that just balances the box is half a pound. How many ounces does the box weigh?

5. If George puts the quarter pound weight on the scales with the half pound weight, what part of a pound of sand will he have to pour into the box to make the scales balance again? how many ounces of sand?

How many ounces do box and sand together weigh?

6. What part of a pound are 8 ounces? 4 ounces?

7. 1 pound less 9 ounces = ?

8. 7 ounces and $\frac{1}{2}$ pound = ?

9. 14 oz. less $\frac{1}{4}$ lb. = ?

10. $\frac{3}{4}$ lb. plus 3 oz. = ?

PERIMETER AND AREA

44. 1. Draw an oblong 5 inches long and 2 inches wide. How many inches is it around the oblong?

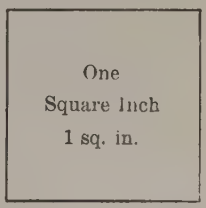
2. This distance is called the **perimeter** of the oblong.

3. Cut out of paper an oblong 6 in. long and 3 in. wide, or "6 in. by 3 in." Find its perimeter.

4. Find the perimeter of an oblong 5 in. by 4 in.

5. What is the perimeter of a triangle whose sides are each 4 in. long? 5 in. long?

45. 1. Measure the sides of this square. How long is it? How wide is it?



2. A square whose sides are each 1 inch long is called a **square inch**.

3. Take a piece of paper 2 in. by 1 in. and fold it into square inches. How many square inches of paper are there?

4. Cut three strips of paper each 3 in. by 1 in. How many square inches does each contain?

5. Arrange two of the strips to form an oblong 2 in. wide. How long is the oblong?

How many square inches does it contain?

2×3 sq. in. are —— sq. in.

6. Use the three strips to make a square.

How long is the square? How wide is it?

How many square inches does it contain?

3×3 sq. in. are —— sq. in.

A square 3 in. by 3 in. is called a 3-inch square.

7. This picture represents an oblong 5 in. by 3 in. divided into square inches.

How many square inches are there in 1 row? in 2 rows? in 3 rows?

How many square inches does the oblong contain?

3×5 sq. in. are —— sq. in.

8. Draw an oblong 4 in. by 2 in. Find its area.

In one row of square inches there are 4 sq. in.
In two rows there are 2×4 sq. in., or —— sq. in.

9. This is called the **area** of the oblong.

10. A square whose sides are each one foot long is called a **square foot**; a square whose sides are each one yard long is called a **square yard**.

11. How long and how wide is a 5-inch square? a 3-foot square? a 10-yard square?

12. How many square feet are there in a 3-foot square? in a yard square?

13. How many square feet are there in a square yard?

Nine square feet equal one square yard.
9 sq. ft. = 1 sq. yd.

46. Find the perimeter and area of:

1. A 4-inch square.
2. A 5-foot square.
3. An oblong 4 in. by 3 in.
4. A card 7 in. by 5 in.
5. A blotter 8 in. by 4 in.
6. A rug 3 yd. square.
7. A table top 4 ft. square.
8. A floor 5 yd. by 4 yd.
9. A desk top 3 ft. by 5 ft.
10. An envelope 6 in. by 3 in.

MEASURING TIME

47. 1. Read the letters on the clock face. Tell what they mean.

2. Observe the little spaces marked on the rim just outside of the letters.

These are *minute spaces.*

3. Count the number of minute spaces between XII and I; I and II; X and XI.

How many minute spaces does the minute hand pass over in moving from XII around to XII again?

4. What time is it when both hands point toward XII?

Where will the hands be pointing one hour later?

How many minute spaces will the minute hand move over during that time?

5. How many minutes are there in an hour?

Sixty minutes equal one hour.
60 min. = 1 hr.

6. How many minutes are there in half an hour? in a quarter of an hour? in three quarters of an hour?

7. Draw a clock face to show a quarter *past* four o'clock; a quarter *to* 5; 20 min. *past* 7; 25 min. *to* 8.

When the time is more than half *past* an hour, we may tell it by giving the number of minutes *to* the next hour.

8. What time is it when the minute hand is at III, and the hour hand is a little past X? when the minute hand is at VIII and the hour hand nearer VI than V?

9. For "20 minutes past 1" we often say "*one twenty*," and write 1:20; for "20 minutes to 2," "*one forty*," and write 1:40.

10. Read in two ways: 11:20; 2:50; 3:15; 10:35; 4:05; 6:10; 8:40; 2:45.

11. What time is it when the minute hand points to I, and the hour hand is near VI? when the minute hand points to X, and the hour hand is near XII?

12. Where do the hands of a clock point when it is 25 min. past 4? a quarter to 12? ten fifty? six thirty? one ten? 5:50? 7:10? 3:48? 6:05? 1:55?

48. 1. Count on the clock face the number of hours from 9 o'clock to 9 o'clock again.

2. At what time in the morning does school begin? To what number does the hour hand point at that time?

3. What time of day will it be the next time the hour hand points toward IX? How many hours will that be from the time school began in the morning?

4. How many hours will it be from 9 o'clock at night until school begins the next morning?

5. How many hours is it from school time one morning until school time the next morning? how many days?

6. How many hours are there in a day?

Twenty-four hours equal one day.
24 hr. = 1 da.

This means both the day time and the night time.

7. For telling time the day is divided into two parts.

The time from midnight to noon is called *forenoon*, and the time from noon to midnight is called *afternoon*.

We write A.M. for forenoon and P.M. for afternoon.

Thus, "ten minutes after 9 in the morning" is written 9:10 A.M., and "ten minutes after 9 in the evening" is written 9:10 P.M.

8. If you start for school at 8:20 A.M. and arrive at 8:50 A.M., how long are you on the way?

9. How long a time is it from 11:25 A.M. to noon?

10. How many hours is it from 9 A.M. to 4 P.M.?

49. 1. What day of the week is this? Name all the days of the week. How many are there?

Seven days equal one week.
7 da. = 1 wk.

2. Find on this *calendar* the short ways of writing the names of the days.

1907 DECEMBER 1907

Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

3. How many days are there in December? how many weeks and how many days over?

4. December is the last month in the year. January is the first month in the year. Can you name all the months? How many are there?

The names of the months are often written in this way: Jan., Feb., Mar., Apr., May, June, July, Aug., Sept., Oct., Nov., Dec.

5. On what day of December does Christmas come?

The date of Christmas Day, 1907, is written,

Wednesday, Dec. 25, 1907.

6. Write the date for New Year's Day in 1908; the date of to-day; of to-morrow; of a week from to-day.

7. Write the date of your next birthday; of the next holiday; of other holidays.

8. If you leave home at 7:40 P.M. on Friday and are gone 20 hours, at what time do you return?

WRITTEN EXERCISES

50. Here are two problems about an oblong 4 inches by 2 inches.

1. What is the area of an oblong 4 in. by 2 in.?

Area = 2 × 4 sq. in. = 8 sq. in.

2. What is the perimeter of an oblong 4 in. by 2 in.?

Perimeter = 4 in. + 2 in. + 4 in. + 2 in. = — in. = — ft.

Make and solve as many problems as you can about:

3. A window 5 ft. by 3 ft., with panes 1 foot square.
4. A room the floor of which is 6 yd. by 5 yd.
5. A week less 2 days (Saturday and Sunday).
6. The number of days in 4 weeks.
7. An hour less 20 minutes.
8. Two books, one weighing 12 oz., the other 24 oz.
9. The number of days in December after Dec. 11.
10. The number of hours from 8 P.M. to 7 A.M.

READING AND WRITING NUMBERS

51. 1. Count by ones from 1 to 10, thus: "1 one, 2 ones," etc. Write each number as you name it.

2. What is the largest number of ones that can be written with one figure? How many figures are needed to write ten ones?

1 ten ten ones

3. 10 means either ten *ones* or 1 ten (and 0 ones). In what place, counting from the right, does 1 stand when it means 1 *ten?* Show this with other numbers than 10, as 11, 12, etc.

4. Calling 10 "1 ten," count by tens from 10 to 100. Write each number as you name it.

5. What is the largest number of tens written with two figures? How many figures are needed to write ten tens?

6. 100 means either ten *tens* or 1 *hundred* (and 0 tens and 0 ones). In what place, counting from the right, does 1 stand when it means 1 *hundred?*

7. What does 1 mean when it stands in ones' place? in tens' place? in hundreds' place? What does 2 mean in ones' place? in tens' place? in hundreds' place?

8. Write in figures:

3 ones.	Four hundred.	Seven hundred.
3 tens.	Five hundred.	Eight hundred.
3 hundreds.	Six hundred.	Nine hundred.

9. Ten hundred, written 1000, is called **one thousand**.

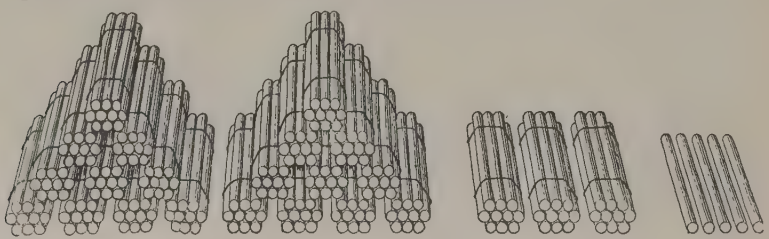
10. Read: 10, 30, 60, 90, 100, 200, 500, 700, 900, 1000.

52. 1. The number that is 1 greater than 100 is 101, read "one hundred one." The number that is 2 greater than 100 is 102, read "one hundred two."

2. Count from 100 to 109, writing the numbers in a column as you name them, with hundreds under hundreds, tens under tens, and ones under ones.

3. 110 is read "one hundred ten." Name the numbers from 110 to 119 and write them in a column by the side of your first column of numbers.

4. Continue naming numbers until you reach 149, writing them in columns of ten numbers each.



2 hundreds 3 tens 5 ones

5. What number is shown in this picture? Write the number and tell what each figure means.

6. Tell what each figure means in these numbers:

10	100	112	167	266	307	999
25	110	240	384	502	222	1000

7. In numbers that are written with three figures, *the first figure, counting from right to left, stands for ones, the second figure for tens, and the third figure for hundreds.*

EXERCISES

53. 1. Read these numbers:

375	822	610	160	300	202
462	555	106	601	251	909

2. Write in figures, placing hundreds under hundreds, tens under tens, and ones under ones:

Four hundred sixty-five.
Two hundred forty-eight.
Six hundred sixty-one.
One hundred ninety-six.
Three hundred forty-four.
Five hundred eighty-eight.
One hundred seventy-two.
Three hundred forty-three.
Seven hundred seventy-six.
Nine hundred.
Eight hundred one.
One hundred twelve.
Six hundred thirty.
Ninety-nine.
Nine hundred nine.
Eight hundred five.
Eight hundred fifty.
One thousand.

3. 463 means —— hundreds —— tens and —— ones.

4. Tell in the same way what these numbers mean:

756, 242, 403, 250, 632, 190, 333, 444, 206.

5. What number is 1 less than 10? than 100? than 200? than 550? than 910? than 1000?

6. What number is 10 greater than 100? 10 less than 100? 10 less than 550? 20 greater than 760?

7. Name and write the numbers that are 100 greater than the following; also the numbers that are 100 less:

300, 325, 684, 522, 736, 109, 204, 900, 777.

8. What is the smallest 3-figure number? the largest?

ADDITION

54. Express each sum as tens or as tens and ones:

1.	9	5	6	7	8	8	8
	1	5	4	3	2	3	4
2.	40	45	46	47	48	48	48
	30	35	34	33	32	33	34

WRITTEN EXERCISES

1. Find the sum of 48 and 34.

48
34
82

How many ones are 4 ones and 8 ones?
In 12 ones there are 1 ten and 2 ones.
Write the 2 ones under the ones, and keep the 1 ten to add to the 3 tens and 4 tens.

How many tens are 1 ten and 3 tens and 4 tens?
Write the number of tens under the tens.
What, then, is the sum of 48 and 34?
Tell all you did to find the sum.

Add the following:

2.	57	3. 49	4. 46	5. 69	6. 36
	15	14	37	26	64
7.	46	8. 32	9. 19	10. 29	11. 78
	26	29	45	47	22
12.	65	13. 43	14. 47	15. 59	16. 36
	17	38	47	39	24

Add upward and test your answer by adding downward:

17. 33	18. 28	19. 65	20. 28	21. 17
24	41	4	10	2
33	22	25	44	53
22. 44	23. 37	24. 29	25. 17	26. 14
16	4	15	65	24
23	42	21	3	47
27. 22	28. 16	29. 37	30. 24	31. 18
35	13	6	37	19
18	48	42	16	18
7	16	9	19	22
32. 18	33. 26	34. 37	35. 19	36. 18
27	8	18	17	18
19	38	9	29	18
28	19	28	29	18

WRITTEN EXERCISES

55. 1. Ruth weighs 48 pounds and Edith 45 pounds. How much do both weigh?

2. Isabel picked 17 poppies and 28 pinks. How many flowers did she pick?

3. If 26 days since the term began have been sunny and 18 cloudy, how many days have passed?

4. Percival telephoned 34 times in May, 29 times in June, and 25 times in July. How many times did he telephone in the three months?

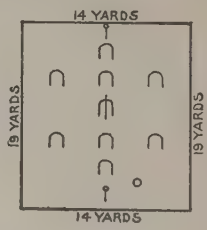
5. John and Ira went nutting. John got 12 pounds of nuts and Ira 18 pounds. How many pounds did both get?

6. John had 37 walnuts and 48 butternuts. Ira had 54 walnuts and 49 butternuts. How many walnuts had both boys? how many butternuts?

7. The next time they went nutting they got 56 pounds of walnuts, 18 pounds of hickory nuts, and 25 pounds of hazelnuts. How many pounds of nuts did they get in all?

8. Into a dish they put 26 walnuts, 17 hazelnuts, 25 hickory nuts, and 8 butternuts. How many nuts were there in the dish?

9. How many yards is it around this croquet ground?



10. What is the perimeter of an oblong lot that is 36 yards long and 13 yards wide?

11. What is the perimeter of a 25-foot square?

12. Measure the length and width of your schoolroom and find its perimeter.

13. It is 29 miles from Albion to Berne, and Canton is

18 miles farther on than Berne. How far is it from Albion to Canton?

14. If you ride on the train from Albion to Canton and back again, how many miles do you ride?

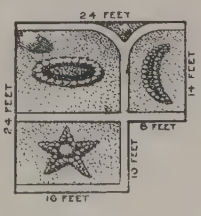
Add and test:

15.	16.	17.	18.	19.
16 weeks	24 days	18 min.	27 lb.	18 oz.
13 "	19 "	17 "	7 "	16 "
7 "	8 "	16 "	28 "	9 "
18 "	10 "	27 "	12 "	14 "
26 "	19 "	22 "	9 "	15 "

20.	21.	22.	23.	24.	25.
$15	$18	$16	$17	$19	$18
7	4	39	7	19	18
8	7	9	18	9	19
9	28	6	8	19	9
14	9	8	29	9	8
17	16	7	9	19	9

26. Mrs. Chase went to do her Christmas shopping. She spent $14 for books, $28 for other useful articles, $5 for toys, $1 for a Christmas tree, and $2 for decorations. How much did she spend?

27. This is a picture of Ella's garden. How many feet is it around the garden?



28. My bookcase contains 18 books on the top shelf; 16 on the next; and 21, 15, 14, 12, in order to the bottom. How many books are there in the bookcase?

29. A milkman had five cans of milk on his wagon, containing 24 qt., 16 qt., 20 qt., 17 qt., and 19 qt., respectively. How many quarts of milk were there in the five cans?

56. 1. Express as hundreds: $50+50$; $40+60$; $70+30$.

2. Express as hundreds and tens: $70+40$; $70+50$; $70+80$.

3. How many hundreds are 5 hundreds + 2 hundreds? $500+200$ and $50+50$? $500+200$ and $40+60$?

4. Add $500+70$ and $200+30$; or add 570 and 230.

5. Add:

550	540	570	570	570	570
250	260	230	240	250	280

WRITTEN EXERCISES

1. Find the sum of 574 and 289.

574
289
863

Add the ones. What is their sum?
$13 = 1$ ten $+ 3$ ones. Write only the 3 ones.
Add the tens, beginning with the 1 ten not yet written. 1 ten + 8 tens + 7 tens = ——.
16 tens = 1 hundred + 6 tens. Write only the 6 tens.
Add the hundreds, beginning with the 1 hundred not yet written. 1 hundred + 2 hundreds + 5 hundreds = ——.
Read the sum. Tell all you did to obtain it.

Add the following:

2. 435	3. 243	4. 625	5. 367	6. 573
128	581	299	484	369
7. 508	8. 627	9. 486	10. 548	11. 281
294	275	314	252	719
12. 324	13. 518	14. 489	15. 269	16. 587
249	173	256	347	166

Add and test:

17. 127	18. 489	19. 287	20. 777	21. 685
366	98	269	77	99
208	366	97	7	129
22. 364	23. 188	24. 406	25. 265	26. 388
247	243	308	93	277
87	462	16	64	66
196	38	94	256	222
27. 376	28. 492	29. 209	30. 199	31. 178
89	39	89	99	279
235	48	38	88	177
144	253	419	457	276
32. 124	33. 218	34. 156	35. 139	36. 499
60	43	185	68	98
208	75	96	29	77
43	302	278	387	89
112	291	149	179	237
37. 288	38. 162	39. 296	40. 239	41. 199
23	83	69	99	88
37	29	86	78	98
40	37	178	68	89
92	62	99	49	67
101	289	167	379	459

MAKING CHANGE

57. For the exercises below, each pupil who orders a lunch should have a half dollar and two quarter dollars, or something to represent these coins.

The teacher appoints a waiter and a cashier.

The cashier has red slips of paper marked 1 for 1-cent coins, white slips marked 5 for 5-cent coins, and blue slips marked 10 for dimes.

ULSTER LUNCH

BILL OF FARE

Ham Sandwich	5	Oysters	20
Egg Sandwich	5	Rolls, each	2
Chicken Sandwich	10	Baked Beans	15
Eggs, each	5	Coffee	5
Egg on Toast	7	Coffee with Cream	8
Potatoes	5	Tea	5
Ham & Eggs	20	Chocolate	5
Beefsteak	25	Milk	3
Pork Chops	15	Pie or Cake	5
Lamb Chops	15	Ice Cream	10

EXERCISES

1. This is Edith's order: "Beefsteak, 2 rolls, coffee."

The waiter announces the cost, "34 cents." Is he right?

Edith gives the cashier 50 cents.

The cashier says "34 cents"; then gives Edith 1 cent, and says "35"; then 5 cents, and says "40"; then a dime, and says "50."

Has Edith received the right change?

In the following exercises the cashier should count out change as he did in exercise 1. If the waiter or the cashier makes an error, he should be discharged and another employed in his place.

2. Alfred orders 2 ham sandwiches; he pays with 25¢.

3. Roy orders coffee with cream; he pays with 25¢.

Order other lunches. Here are some specimen orders, each with the amount given to the cashier in payment:

4. Egg on toast; 25¢.
5. Ham and eggs; 50¢.
6. Beefsteak, pie; 50¢.
7. Chicken sandwich; 25¢.
8. Chocolate, 3 rolls; 25¢.
9. Egg on toast, tea; 25¢.
10. Oysters, tea, pie; 50¢.
11. Ice cream, cake; 50¢.
12. Oysters, beans; 50¢.
13. Pork chops, 1 roll; 25¢.
14. Ham sandwich, milk; 25¢.
15. Milk, 3 rolls; 25¢.
16. Egg sandwich, coffee with cream; 25¢.
17. Milk, pie, ice cream; 25¢.
18. Beefsteak, potatoes, milk; 50¢.
19. Ham and eggs, 3 rolls, coffee with cream; 50¢.
20. Oysters, 2 rolls, chocolate; 50¢.
21. Beefsteak, egg on toast; 50¢.
22. Beans, pork chops, fried potatoes, 1 roll; 50¢.
23. Lamb chops, 3 rolls, chocolate, apple pie; 50¢.
24. Egg on toast, beefsteak, oysters; 75¢.
25. Oysters, beefsteak, coffee with cream, cake; 75¢.
26. Pork chops, potatoes, beans, ice cream; $1.
27. Baked beans, 3 rolls, coffee with cream; 50¢.
28. Beefsteak, egg on toast, potatoes, coffee with cream, cranberry pie, cake, ice cream; $1.
29. For 4 boys: 8 eggs, 8 rolls, 4 glasses of milk; 75¢.
30. For 2 persons: 6 rolls, 2 eggs, 2 beefsteaks, 1 cup of coffee with cream, 1 glass of milk; $1.

SUBTRACTION

58. Subtract:

8 tens	80	15	80 + 15 = 95
2 tens	20	7	20 + 7 = 27

WRITTEN EXERCISES

1. From 95 subtract 27.

$$\begin{array}{r} 95 \\ 27 \\ \hline 68 \end{array}$$

Can you subtract 7 ones from 5 ones? Then take 1 ten from the 9 tens to unite with the 5 ones.

How many ones are 1 ten and 5 ones?

Now subtract 7 ones from 15 ones. How many ones are left? Write the difference under the ones.

How many tens have you already taken from the 9 tens? How many tens are left?

Then subtract the 2 tens from 8 tens. How many tens are left? Write the difference under the tens.

What, then, is the difference between 95 and 27?

Tell all you did to find the difference.

Subtract, and test each result as on page 28:

2. 47	**3.** 70	**4.** 92	**5.** 43	**6.** 33
28	33	79	26	15
7. 61	**8.** 64	**9.** 56	**10.** 82	**11.** 58
43	48	17	37	29
12. 25	**13.** 98	**14.** 60	**15.** 55	**16.** 83
19	79	26	36	48

Subtract and test:

17. 76 38	18. 83 68	19. 21 16	20. 86 48	21. 96 59
22 62 48	23. 67 49	24. 82 37	25. 71 57	26. 54 28
27. 78 69	28. 56 38	29. 93 66	30. 41 19	31. 61 46
32. 54 15	33. 45 28	34. 74 35	35. 80 17	36. 72 37

WRITTEN EXERCISES

59. 1. Eliza has 50¢. If she were to spend 35¢ for a doll, how much money would she have left?

2. If instead of the doll she were to buy a set of dishes costing 32¢, how much money would she have left?

3. Suppose she gave 28¢ to John to buy a knife worth half a dollar. How much more money would he need?

4. How much more than 28¢ would he need to buy a knife worth 75¢? 60¢? 40¢?

5. Roy can jump 50 inches and Clarence 38 inches. How much farther can Roy jump than Clarence?

6. How many days are there in December? How many days of December are left after Dec. 15?

7. How many minutes is it from 9:15 A.M. to 10 A.M.?

8. Lucy has 90 picture post cards, and Sarah has 75. How many more has Lucy than Sarah?

9. Cut a foot of string from a piece 30 inches long. How many inches of string are left?

10. When Frank went to visit his uncle, he had to ride 40 miles in an automobile. When he had ridden 25 miles, how far had he yet to ride?

11. How far had Frank ridden when he had only 12 miles farther to ride?

12. George can throw a ball 36 yards, and Paul can throw it 60 yards. How much farther can Paul throw the ball than George?

Subtract and test:

13.	14.	15.	16.	17.	18.
\$53	\$40	\$81	\$96	\$37	\$86
\$27	\$18	\$14	\$77	\$19	\$68

19.	20.	21.	22.	23.	24.
55¢	42¢	50¢	62¢	36¢	98¢
28¢	25¢	34¢	49¢	17¢	69¢

25. Henry bought 90 eggs for hatching, but 18 of them failed to hatch. How many chickens did he get from the whole number of eggs?

26. Fifteen of the chickens died before three months. How many chickens were left at the end of the three months?

27. Of the chickens that were left, all except 18 were sold. How many were sold?

28. Speckle ate 52 grains of corn and Fluffy ate 36. How many more grains did Speckle eat than Fluffy?

29. Fluffy laid 54 eggs while Speckle laid 49. How many more eggs did Fluffy lay than Speckle?

60. Subtract:

1.	5 hundreds	500	800	460	150	180
	2 hundreds	200	600	300	70	90
2.	700	140	9	$700+140+9=849$		
	300	80	5	$300+80+5=385$		
3.	800	110	8	$800+110+8=918$		
	500	40	2	$500+40+2=542$		

WRITTEN EXERCISES

Subtract and test:

1.	849	2. 918	3. 239	4. 556	5. 827
	385	542	72	283	562
6.	580	7. 636	8. 453	9. 145	10. 769
	257	84	428	75	288
11.	646	12. 865	13. 648	14. 452	15. 860
	339	507	70	239	528
16.	888	17. 918	18. 243	19. 487	20. 365
	79	640	91	395	84

61. Subtract:

1.	600	150	13	$600+150+13=763$
	400	70	5	$400+70+5=475$
2.	800	120	14	$800+120+14=934$
	200	50	6	$200+50+6=256$

WRITTEN EXERCISES

1. From 934 subtract 256.

$$\begin{array}{r} {\scriptstyle 8\ \ 12\ \ 14} \\ 9\ 3\ 4 \\ 2\ 5\ 6 \\ \hline 6\ 7\ 8 \end{array}$$

Can you subtract 6 ones from 4 ones?

Then take 1 ten from 3 tens to unite with the 4 ones. To how many ones is 1 ten equal? 1 ten and 4 ones?

How many ones, then, are 14 ones − 6 ones?

Write 8 under the ones.

How many tens have you already taken from the 3 tens? How many tens are left?

Can you subtract 5 tens from 2 tens?

Then take 1 hundred from the 9 hundreds to unite with the 2 tens. To how many tens is 1 hundred equal? 10 tens and 2 tens?

How many tens are 12 tens − 5 tens?

Write 7 under the tens.

How many hundreds have you taken from the 9 hundreds? How many hundreds are left?

How many hundreds are 8 hundreds − 2 hundreds?

Write 6 under the hundreds.

You have subtracted 256 from 934.

Read the difference. Tell all you did to find it.

Subtract and test:

2. 432 154	3. 578 299	4. 342 85	5. 861 476	6. 426 348
7. 564 365	8. 777 88	9. 838 549	10. 675 96	11. 381 193
12. 234 75	13. 586 297	14. 344 69	15. 735 486	16. 626 27

62. Subtract:

1. 400	90	14	$400+90+14=504$
200	20	6	$200+20+6=226$
2. 600	90	12	$600+90+12=702$
500	30	8	$500+30+8=538$

WRITTEN EXERCISES

1. From 702 subtract 538.

$$\begin{array}{r} {\scriptstyle 6\ \ 9\ 12} \\ 7\ 0\ 2 \\ 5\ 3\ 8 \\ \hline 1\ 6\ 4 \end{array}$$

Can you subtract 8 ones from 2 ones? Can you take 1 ten from 0 tens? Then take 1 hundred from the 7 hundreds, change it to 10 tens, and take 1 of these tens to unite with the 2 units; that is, change 7 hundreds 0 tens and 2 units to 6 hundreds 9 tens and 12 units, and subtract.

Subtract and test:

2. 307 169	3. 806 248	4. 400 91	5. 504 346	6. 902 705
7. 701 426	8. 208 79	9. 803 466	10. 105 47	11. 600 579
12. 900 101	13. 707 278	14. 306 99	15. 505 268	16. 807 629

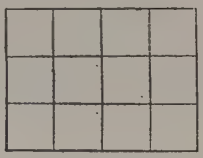
WRITTEN EXERCISES

63. Subtract and test:

1. 758 324	2. 596 206	3. 465 98	4. 581 257	5. 600 463
6. 947 684	7. 405 83	8. 708 640	9. 198 79	10. 314 128
11. 666 99	12. 700 637	13. 111 35	14. 876 345	15. 644 67
16. 406 348	17. 513 45	18. 263 249	19. 300 31	20. 765 208
21. 375 243	22. 808 709	23. 633 38	24. 263 184	25. 500 372
26. 740 309	27. 403 272	28. 987 832	29. 800 508	30. 585 396

MULTIPLICATION

64. 1. In this oblong, how many squares are there in each horizontal row?



Count the squares by 4's.

2. How many squares are there in each vertical row, or column?

Count the squares by 3's.

3. Compare 3 times 4 squares with 4 times 3 squares.

4. In what two ways have you found the number of squares? Compare three 4's with four 3's in this way:

Three 4's = four 3's, or 12.

$3 \times 4 = 4 \times 3$, or 12.

5. Count these dots by 5's. Count them by 3's. Compare three 5's with five 3's, and write the result as in exercise 4.

6. Using squares, or dots, or buttons, etc., compare three 2's with two 3's as in exercise 4.

7. Add three 6's. Add six 3's. Compare the sums, and write the result as above. Also compare three 7's with seven 3's.

8. Copy and complete as in the first column:

$2 \times 6 = 6 \times 2 =$	$3 \times 6 =$	$4 \times 6 =$	$5 \times 6 =$
$2 \times 7 = 7 \times 2 =$	$3 \times 7 =$	$4 \times 7 =$	$5 \times 7 =$
$2 \times 8 =$ ——— $=$	$3 \times 8 =$	$4 \times 8 =$	$5 \times 8 =$
$2 \times 9 =$ ——— $=$	$3 \times 9 =$	$4 \times 9 =$	$5 \times 9 =$
$2 \times 10 =$ ——— $=$	$3 \times 10 =$	$4 \times 10 =$	$5 \times 10 =$

EXERCISES

65. 1. Give the table of 2's, from 1×2 to 10×2.

2. In the same way give the tables of 3's, 4's, and 5's.

3. Besides these you have learned the 6's to 5×6, the 7's to 5×7, the 8's to 5×8, the 9's to 5×9, and the 10's to 5×10. Give these tables as far as you can.

4. Tell quickly the value of each of the following:

5×3	3×7	2×7	9×4	4×10	5×6
4×7	4×6	4×5	2×6	4×8	2×9
6×4	3×6	2×8	7×3	4×9	9×5

WRITTEN EXERCISES

66. 1. How many are four 32's, or 4 times 32?

$$\begin{array}{r} 32 \\ 32 \\ 32 \\ 32 \\ \hline 128, \text{ sum} \end{array}$$

The sum of four 32's is 128.

Four 32's may be added also in this way:

Four 2's are 8, the number of ones; four 3's are 12, the number of tens; 12 tens + 8 ones = 120 + 8 = 128.

Here is a shorter process for finding 4 times 32.

$$\begin{array}{r} 32 \\ 4 \\ \hline 128, \text{ product} \end{array}$$

Write 4 under the last figure of 32.

4 times 2 ones = 8 ones.

4 times 3 tens = 12 tens.

12 tens + 8 ones = 120 + 8 = 128.

You have **multiplied** 32 by 4.

The answer, 128, is the **product** of 32 and 4.

Here are two short ways of writing $32+32+32+32$:

First way. 4×32, read "4 times 32."

Second way. 32×4, read "32 multiplied by 4."

This shows that $\times$ is read "*times*" when it is *before* the number to be multiplied, and "*multiplied by*" when it *follows* the number to be multiplied.

$\begin{array}{r} 32 \\ \times 4 \\ \hline \end{array}$ means "multiply 32 by 4"; or, "find 4 times 32."

2. Find the value of $23+23+23$ by addition and then by multiplication.

3. Find in two ways the value of $41+41+41+41+41$. Which is the shorter way?

Find results and compare them:

4.		5.		6.	
		12		62	
24	24	+12	12	+62	62
+24	×2	+12	×3	+62	×3

	7.	8.	9.	10.	11.
Multiply	14	31	92	21	40
By	2	2	2	3	3

	12.	13.	14.	15.	16.
Multiply	53	82	91	80	71
By	3	3	2	2	3

	17.	18.	19.	20.	21.
Multiply	40	22	31	50	81
By	4	4	4	5	5

22. Multiply 47 by 5.

47
5
235

5 times 7 = 35, or 3 tens and 5 ones.
Write 5 in the product, under the ones, and keep the 3 tens to add to 5 times 4 tens.

5 times 4 tens = 20 tens, and 20 tens + 3 tens = 23 tens.
Write 23 in the product, before 5.
The product is 23 tens and 5 ones, or 235.
Tell all you did to find the product.

Multiply, testing each result by addition:

23. 48 × 2	**24.** 54 × 3	**25.** 66 × 3	**26.** 75 × 3	**27.** 95 × 2
28. 86 × 2	**29.** 37 × 3	**30.** 63 × 4	**31.** 26 × 4	**32.** 44 × 4
33. 53 × 5	**34.** 24 × 5	**35.** 92 × 5	**36.** 64 × 5	**37.** 16 × 4

Multiply:

38. 22 by 5	**42.** 53 by 5	**46.** 76 by 5
39. 29 by 2	**43.** 99 by 2	**47.** 86 by 3
40. 77 by 4	**44.** 49 by 3	**48.** 99 by 4
41. 36 by 3	**45.** 88 by 4	**49.** 78 by 4

50. Find the product of 75 and 4; of 3 and 66.

SUGGESTION. — Multiply the larger number by the smaller.

Find the product of:

51. 48 and 2	**57.** 2 and 65	**63.** 85 and 4
52. 61 and 5	**58.** 5 and 52	**64.** 5 and 38
53. 38 and 3	**59.** 3 and 97	**65.** 95 and 5
54. 82 and 5	**60.** 4 and 85	**66.** 2 and 89
55. 89 and 4	**61.** 4 and 57	**67.** 87 and 4
56. 96 and 3	**62.** 2 and 99	**68.** 5 and 99

WRITTEN EXERCISES

67. **1.** How much will 2 quarts of ice cream cost at 35 cents a quart?

$$\begin{array}{r} 35¢ \\ \times\ 2 \\ \hline 70¢ \end{array}$$

2 quarts of ice cream will cost 2 times 35¢, or 70¢.

2. How much money does a boy need to buy 4 collars at 15 cents each?

Find the cost of the following:

3. 2 quarts of oysters at 45 cents a quart.

4. 5 pineapples at 15 cents each.

5. 2 boxes of honey at 14 cents a box.

6. 5 bunches of celery at 16 cents a bunch.

7. 3 pounds of nuts at 18 cents a pound.

8. 3 gallons of sirup at 33 cents a gallon.

9. 5 pounds of figs at 18 cents a pound.

10. How many inches are there in 4 feet?

11. Charles planted 5 rows of tulip bulbs, 56 in each row. How many tulip bulbs did he plant?

12. How many ounces are there in 2 pounds?

13. Mary's bed of pansies is 18 feet long and 4 feet wide. What is the area of the bed?

Multiply:

14.	15.	16.	17.	18.
$25	12 pens	36 stars	24 trees	39 ft.
5	4	3	4	5

19.	20.	21.	22.	23.
$75	22 days	54 boys	88 books	98 lb.
3	5	4	5	4

24. How many minutes are there in 5 hours?

25. Twenty things equal a **score**. Mabel's grandfather is fourscore years old. How many years old is he?

26. John's cousins number twoscore. How many cousins has he?

27. How many hours are there in 3 days?

28. A square garden 95 feet on each side is inclosed by a fence. How long is the fence?

29. How many tomato plants are there in 4 rows, if there are 13 in each row?

30. Find the number of cabbages in 3 rows, if there are 38 cabbages in each row.

31. Find the area of a turnip bed 87 feet by 5 feet.

DIVISION

68. 1. Four 3's are ——. Three 4's are ——. What is the product of 4 and 3?

2. How many times does the product of 4 and 3 contain 3? How many times does the same product contain 4?

$4 \times 3 = ?$ $12 \div 3 = ?$ $12 \div 4 = ?$

3. Count these squares by 2's; by 4's. How many times does the product of 4 and 2 contain 2? How many times does it contain 4?

$4 \times 2 = ?$ $8 \div 2 = ?$ $8 \div 4 = ?$

4. How many times does 5×3 contain 3? How many times does 5×3 contain 5? How do you know?

5. How many times does 8×2 contain 2? How many times does 8×2 contain 8? How do you know?

EXERCISES

69. Answer quickly:

1.	$6 \times 2 =$	$12 \div 2 =$	$12 \div 6 =$	9.	$27 \div 3 =$
2.	$7 \times 2 =$	$14 \div 2 =$	$14 \div 7 =$	10.	$27 \div 9 =$
3.	$8 \times 2 =$	$16 \div 2 =$	$16 \div 8 =$	11.	$30 \div 3 =$
4.	$9 \times 2 =$	$18 \div 2 =$	$18 \div 9 =$	12.	$30 \div 10 =$
5.	$10 \times 2 =$	$20 \div 2 =$	$20 \div 10 =$	13.	$24 \div 4 =$
6.	$6 \times 3 =$	$18 \div 3 =$	$18 \div 6 =$	14.	$24 \div 6 =$
7.	$7 \times 3 =$	$21 \div 3 =$	$21 \div 7 =$	15.	$28 \div 4 =$
8.	$8 \times 3 =$	$24 \div 3 =$	$24 \div 8 =$	16.	$28 \div 7 =$

Answer quickly:

17. $32 \div 8 =$	20. $50 \div 10 =$	23. $35 \div 7 =$
18. $36 \div 9 =$	21. $30 \div 10 =$	24. $45 \div 9 =$
19. $30 \div 6 =$	22. $40 \div 10 =$	25. $40 \div 8 =$

26. How many boxes of Christmas candles costing 6 cents a box can be bought for 24 cents?

27. Ruth has 32 lily bulbs to plant. If she plants 8 in a row, how many rows will she have?

28. A man wishes to plant 45 trees in 5 equal rows. How many trees shall he plant in each row?

29. Last summer Louise spent 21 days at her uncle's. How many weeks did she visit him?

30. A large milk can holds 32 quarts. How many gallons does it hold?

31. Clara's father gave her 50 cents in dimes. How many dimes did he give her?

32. How many yards of ribbon costing 9 cents a yard can be bought for 27 cents?

70. 1. Find $\frac{1}{2}$ of 8. Find how many times 8 contains 2. How do your answers compare?

2. $8 \div 2$, read "8 divided by 2," means either "*Find* $\frac{1}{2}$ *of* 8," or "*Find how many times* 8 *contains* 2."

Another way to write $8 \div 2$ is $2\overline{)8}$.

3. $12 \div 3$, or $3\overline{)12}$, means either "*Find* $\frac{1}{3}$ *of* 12," or "*Find how many times* 12 *contains* 3."

What two meanings may $6 \div 2$ have? $4\overline{)12}$? $5\overline{)10}$?

Give results quickly:

4.	$\frac{1}{2}$ of 6	$6 \div 2$	$\frac{1}{3}$ of 6	$6 \div 3$
5.	$\frac{1}{3}$ of 15	$3\overline{)15}$	$\frac{1}{5}$ of 20	$5\overline{)20}$
6.	$3\overline{)9}$	$3\overline{)9 \text{ tens}}$	$3\overline{)90}$	$3\overline{)90+3}$
7.	$2\overline{)8}$	$2\overline{)8 \text{ hundreds}}$	$2\overline{)800}$	$2\overline{)800+60+4}$

WRITTEN EXERCISES

1. Find $\frac{1}{2}$ of 64.

How many tens are $\frac{1}{2}$ of 6 tens?

$2\overline{)64}$ Write the number of tens under the tens.

32 How many ones are $\frac{1}{2}$ of 4 ones?

Write the number of ones under the ones.

The answer is 3 tens and 2 ones, or 32.

Test. — $32 + 32$, or 32 multiplied by 2, is equal to 64.

Find:

2. $\frac{1}{2}$ of 42 3. $\frac{1}{3}$ of 39 4. $\frac{1}{4}$ of 88

5. How many times is 2 contained in 864?

2 is contained in 8 hundreds, 4 hundreds times.

$2\overline{)864}$

432 Write 4 under the hundreds.

2 is contained in 6 tens, 3 tens times.

Write 3 under the tens.

2 is contained in 4, 2 times. Write 2 under the units.

You have **divided** 864 by 2, and found that 2 is contained 432 times in 864.

The result, 432, is called the **quotient**.

Test. — 432 multiplied by 2 gives 864, the number divided.

Copy, divide, and test the quotient by multiplication:

6.	7.	8.	9.	10.
2)48	2)26	2)84	2)68	2)680
11.	**12.**	**13.**	**14.**	**15.**
2)440	2)626	2)842	2)406	2)208
16.	**17.**	**18.**	**19.**	**20.**
2)804	2)202	3)69	3)36	3)66
21.	**22.**	**23.**	**24.**	**25.**
3)33	3)360	3)963	3)609	3)396

Find the value of each of the following:

26. $\frac{1}{2}$ of 86	**30.** $44 \div 4$	**34.** $\frac{1}{2}$ of 622
27. $\frac{1}{3}$ of 63	**31.** $84 \div 4$	**35.** $\frac{1}{3}$ of 366
28. $\frac{1}{4}$ of 48	**32.** $55 \div 5$	**36.** $\frac{1}{4}$ of 844
29. $\frac{1}{3}$ of 99	**33.** $505 \div 5$	**37.** $\frac{1}{5}$ of 550

WRITTEN EXERCISES

71. **1.** If 63 pens are divided equally among 3 classes, how many pens will each class receive?

3)63 pens
21 pens

Each class will receive $\frac{1}{3}$ of 63 pens, or 21 pens.

2. If 48 picture cards are divided equally between 2 children, how many will each receive?

3. Four boys made a bobsled. It cost them 84¢, and they shared the expense equally. How much did each pay?

4. If 42 children choose sides for a game of prisoner's base, how many children will there be on each side?

5. A log 64 feet long was sawed into two parts of equal length. How long was each part?

6. Mr. Giles has 96 apricot trees growing in 3 rows, each containing the same number of trees. How many apricot trees are there in each row?

7. If a caddie earns $2 a week, how many weeks will it take him to earn $46?

$2)$46
23 times
23 weeks

The number of weeks it will take him is the same as the number of times that $2 is contained in $46.

$2 is contained 23 times in $46. Therefore it will take him 23 weeks to earn $46.

8. How many 2-cent stamps can be bought for 66¢?

9. If 48 boys march "four abreast," or in 4 columns, how many boys will there be in each column?

10. How many 5-cent stamps can be bought for 55¢?

11. Tell how many quarts there are in 28 pints.

12. How many gallons are there in 40 quarts?

13. Anna's mother made 39 glasses of jelly. One third of it was quince jelly. How many glasses of quince jelly had she?

14. How many yards wide is a road that is 66 feet wide?

PART II

READING AND WRITING NUMBERS

72. 1. Count by ones, or *units*, to 10; by *tens* to 100; by *hundreds* to 1000; by *thousands* to 10,000 (10 thousand).

2. How many units are there in 1 ten? tens in 100? hundreds in 1000? thousands in 10,000?

3. Read: 100 400 700 500 900 1000

What is the largest number of hundreds that can be written with *three* figures?

In what place, counting from the right, does 1 stand when it means 1 *thousand?*

4. Read: 2000 5000 7000 9000 10,000

What is the largest number of thousands that can be written with *four* figures?

5. Read: 1000 1100 1110 1111

What does 1 mean when it stands in thousands' place? in hundreds' place? in tens' place? in units' place?

6. Read: 3000 3300 3330 3333

What does 3 mean when it stands in thousands' place? in hundreds' place? in tens' place? in units' place?

7. Tell what each figure means in these numbers:

40	126	2742	7420	3009
65	304	6037	4600	2704
32	790	3491	8000	9085

8. In four-figure numbers, the *first*, counting from right to left, stands for **units**; the *second*, for **tens**; the *third*, for **hundreds**; and the *fourth*, for **thousands**.

73. 1. The number that is 1 greater than 1000 is 1001, read "one thousand one."

2. Count from 1000 to 1009 and write the numbers in a column as you name them, placing thousands under thousands, hundreds under hundreds, etc.

3. One thousand ten is written 1010.

Name the numbers from 1010 to 1020 and write them in a column as you did the other numbers.

4. Name and write in a column ten numbers in order, beginning with 1095.

EXERCISES

74. 1. Read:

5839	3246	2000	5007	3960
4444	5438	4100	9024	7500
3621	4187	8360	2050	6006
8295	7352	5942	6703	3080

Write in figures:

2. Four hundred twenty-four.
3. Eight thousand two hundred sixty-one.
4. Three thousand nine hundred seventy-six.
5. Five thousand seven hundred fifty-eight.
6. Nine thousand three hundred twenty-seven.
7. Four thousand eight hundred seventy-three.

8. Read:

1374	604	2400	869	6030
4209	7008	920	5555	8742

9. Write in figures, placing thousands under thousands, hundreds under hundreds, etc.:

Ten thousand.
Two thousand nine.
Five hundred forty.
Six thousand sixty.
Nine thousand one.
Three thousand ten.
Eight thousand sixteen.
Six thousand fifty-two.
Two thousand thirty-six.
One thousand eighty-six.
Four thousand two hundred one.
Six thousand one hundred ten.
Eight hundred seventy-three.
Two thousand five hundred six.

75. Sometimes in reading four-figure numbers the thousands and hundreds are read together as hundreds; thus, 2460 may be read, "twenty-four hundred sixty."

EXERCISES

1. Read the following in two ways:

6152	2066	1732	1898	1905
3720	1492	1620	1776	1864

2. Write in figures:

Nineteen hundred.
Sixty hundred fifty.
Fifteen hundred four.
Sixteen hundred seven.
Fifty-six hundred sixty-one.
Eighteen hundred eighty-two.

ADDITION

EXERCISES

76. Add, giving results instantly:

1.	8	5	6	9	5	8	7	9
	7	9	5	8	7	4	6	9
2.	52	74	5	63	7	3	92	34
	6	3	24	5	42	86	5	4
3.	5	43	9	74	57	78	3	6
	75	7	32	6	4	2	49	67

4. Count by 2's from 0 to 20; from 1 to 31.

5. Count by 3's from 0 to 30; from 1 to 43; from 2 to 50.

6. Count by 4's from 0 to 40; from 1 to 49; from 2 to 58; from 3 to 63.

7. Count by 5's from 0 to 50; from 1 to 56; from 2 to 67; from 3 to 73; from 4 to 79.

8. Add *rapidly* and test results:

3	2	5	4	8	9	7	1
7	1	3	2	5	3	0	7
4	6	2	3	8	6	9	6
6	9	1	7	5	7	8	5
2	0	7	9	8	5	9	8
5	7	8	1	5	8	4	9

EXERCISES

77. 1. How many snowballs did Elmer make if he had 7 in one pile, 8 in another, and 6 in another?

2. A farmer sold a calf for \$9 and 3 sheep for \$4 each. How much did he receive for all?

3. A lady bought 5 Christmas cards at 3¢ each and paid 8¢ for envelopes for them. How much did all cost?

4. Edith fed 4 nuts to each of 5 squirrels, and 8 to a chipmunk. How many nuts did she use?

5. There were 14 boys and 8 girls skating on the pond. When 9 of the children went home, how many were left?

6. One caddie carried 8 golf sticks, another carried 5, and 3 others carried 3 each. How many did they all carry?

EXERCISES

78. Add, giving answers at sight:

1.	64	20	48	13	30	56	24	40
	10	52	40	70	17	10	30	23
2.	35	16	30	71	60	26	50	49
	30	40	56	20	37	60	44	30
3.	21	42	36	44	23	61	11	22
	23	41	32	44	23	12	33	22
4.	14	55	41	66	32	22	74	44
	11	22	21	33	21	44	12	33

WRITTEN EXERCISES

79. 1. Find the sum of 2495, 3983, and 1678.

2495
3983
1678
8156

In adding do not think, "8 and 3 are 11 and 5 are 16," but add the units rapidly like this: "8, 11, 16."

Write 6 under the units and add the 1 ten to the tens, thus: "1, 8, 16, 25."

Write 5 under the tens and add 2 with the hundreds: "2, 8, 17, 21."

Write 1 under the hundreds and add 2 with the thousands: "2, 3, 6, 8." Write 8 under the thousands.

Read the sum. Tell how you found it.

Add upward and test by adding downward:

2. 1234 5678 1109	**3.** 3375 2986 3467	**4.** 5209 1872 2369	**5.** 2481 1667 3986
6. 7999 1888	**7.** 4567 3879	**8.** 6472 2328	**9.** 5316 4684
10. 2384 1246 2968	**11.** 7621 978 1346	**12.** 4636 2534 856	**13.** 5426 2809 1765
14. 3427 1902 2345 1063	**15.** 6286 940 1122 657	**16.** 4578 726 1967 2648	**17.** 3888 1222 1777 2345

Add and test:

18.	19.	20.	21.	22.
346	999	562	727	473
791	888	875	908	189
588	123	88	649	694
699	456	769	878	780
247	789	373	999	876

23.	24.	25.	26.	27.
98	45	71	56	99
75	9	36	92	88
46	76	28	6	47
87	88	42	80	76
49	7	97	8	85
66	37	86	87	78

28. $2368 + 74 + 318 + 4092$

29. $3491 + 2350 + 1634 + 2396$

30. $136 + 934 + 673 + 549 + 732$

WRITTEN EXERCISES

80. 1. What was the value of a farmer's crop, if his corn was worth \$325, oats \$298, and potatoes \$663?

MODEL SOLUTION

\$325, corn
298, oats
663, potatoes
\$1286, value of crop

2. How many books are there in three bookcases, if one contains 241 books, another 196, and the third 275?

3. A milk dealer's sales for a day were 152 quarts from one wagon, 136 from another, and 148 from another. How many quarts of milk did he sell that day?

4. A fire engine cost $4625 and a chemical wagon $2075. How much did both cost?

5. A school has 269 pupils in the primary department, 198 in the grammar department, and 152 in the high school. How many pupils are there in the whole school?

6. If one of Mr. Fay's horses weighs 1473 pounds and the other 1514 pounds, how much does the team weigh?

7. A fruit dealer bought four crates of oranges. There were 150 oranges in one, 172 in another, 126 in the third, and 128 in the fourth. How many oranges did he buy?

8. A railway station is 186 feet long and 112 feet wide. What is the distance around it?

9. There are 31 days in March, 30 in April, 31 in May, 30 in June, 31 in July, and 31 in August. How many days are there in these six months?

10. A grocer's wagon carried a barrel of flour, 196 pounds, and a barrel of potatoes, 180 pounds. The barrels weighed 36 pounds and the driver 155 pounds. What was the weight of the load?

11. Mr. Hall bought a city lot for $1345 and built a house on it for $6739. How much did the property cost?

12. In a political parade there were 234 men from the tenth ward, 142 from the eleventh, 287 from the fourteenth, and 358 from the sixteenth. How many men were there from these four wards?

SUBTRACTION

EXERCISES

81. Subtract, giving results instantly:

1.	11	10	12	16	12	13	12	14
	2	7	4	8	5	8	9	8
2.	10	11	14	12	15	11	15	18
	6	4	7	6	9	6	7	9
3.	30	44	16	13	90	52	11	64
	5	8	9	6	9	4	3	8
4.	13	72	25	40	84	17	33	14
	9	5	7	8	6	9	4	9
5.	36	53	74	81	47	23	62	93
	8	7	9	7	8	9	7	6

6. Count backward by 2's from 20 to 0 like this: "20, 18, 16, 14, 12, 10, 8, 6, 4, 2, 0."

Count backward by 2's from 31 to 1.

7. Count backward by 3's from 30 to 0; from 43 to 1; from 50 to 2.

8. Count backward by 4's from 40 to 0; from 49 to 1; from 58 to 2; from 63 to 3.

9. Count backward by 5's from 50 to 0; from 56 to 1; from 67 to 2; from 73 to 3; from 79 to 4.

EXERCISES

82. 1. Clyde has 16 jackstones and Ruth has 9. How many more jackstones has Clyde than Ruth?

2. I bought some sugar and gave the grocer 25¢. If he gave me 7¢ in change, how much did the sugar cost?

3. If a man buys pens at 8¢ a dozen and sells them for 1¢ each, how much does he gain on a dozen?

4. A boy had 18¢. He bought some peanuts for 5¢ and some candy for 4¢. How many cents had he left?

5. Oliver had 14 tin soldiers. He broke 5, and his mother bought him 8 more. How many had he then?

6. Eveline had two kinds of ribbon, 20 yd. in all. She used all but 4 yd. of the white and 3 yd. of the red for Christmas packages. How many yards did she use?

EXERCISES

83. Subtract, giving results at sight:

1.	61	28	41	85	92	67	59	62
	30	10	30	50	20	50	20	40
2.	44	87	98	74	86	93	89	71
	20	70	40	20	40	30	60	30
3.	26	35	68	29	59	47	89	95
	24	31	64	22	53	42	84	92
4.	69	46	85	67	76	93	81	79
	39	26	55	57	26	13	61	39

WRITTEN EXERCISES

84. 1. From 4573 subtract 1625.

$$\begin{array}{r} 4573 \\ 1625 \\ \hline 2948 \end{array}$$

Subtract as follows: 5 from 13 leaves 8; write 8 under the units.

2 from 6, 4; write 4 under the tens. 6 from 15, 9; write 9 under the hundreds. 1 from 3, 2; write 2 under the thousands.

Read the remainder. Tell how you found it.

Test. — Add 1625 and 2948. The result should be 4573.

Subtract and test:

2. $\begin{array}{r} 3561 \\ 1846 \\ \hline \end{array}$	3. $\begin{array}{r} 7326 \\ 3542 \\ \hline \end{array}$	4. $\begin{array}{r} 5438 \\ 4259 \\ \hline \end{array}$	5. $\begin{array}{r} 9627 \\ 2068 \\ \hline \end{array}$
6. $\begin{array}{r} 4319 \\ 2684 \\ \hline \end{array}$	7. $\begin{array}{r} 8094 \\ 4568 \\ \hline \end{array}$	8. $\begin{array}{r} 7843 \\ 5786 \\ \hline \end{array}$	9. $\begin{array}{r} 5406 \\ 2159 \\ \hline \end{array}$

10. From 1608 subtract 843.

$$\begin{array}{r} 1608 \\ 843 \\ \hline 765 \end{array}$$

Subtract: 3 from 8, 5; write 5 under the units. 4 from 10, 6; write 6 under the tens. 8 from 15, 7; write 7 under the hundreds.

Read the remainder.

Tell how you found it.

Subtract and test:

11. $\begin{array}{r} 1406 \\ 572 \\ \hline \end{array}$	12. $\begin{array}{r} 1924 \\ 980 \\ \hline \end{array}$	13. $\begin{array}{r} 1736 \\ 848 \\ \hline \end{array}$	14. $\begin{array}{r} 1802 \\ 971 \\ \hline \end{array}$
15. $\begin{array}{r} 1672 \\ 948 \\ \hline \end{array}$	16. $\begin{array}{r} 1534 \\ 569 \\ \hline \end{array}$	17. $\begin{array}{r} 1372 \\ 1098 \\ \hline \end{array}$	18. $\begin{array}{r} 1706 \\ 1052 \\ \hline \end{array}$

19. From 7000 subtract 796.

$$\begin{array}{r} {\scriptstyle 6\,9\,9\,10} \\ 7000 \\ 796 \\ \hline 6204 \end{array}$$

Subtract: 6 from 10, 4; 9 from 9, 0; 7 from 9, 2; nothing from 6, 6 — writing each figure of the result in its proper place.

Read the remainder. Tell how you found it.

Subtract and test:

20. 4000 − 821	**21.** 1000 − 248	**22.** 6000 − 732	**23.** 8000 − 508
24. 5004 − 756	**25.** 7005 − 680	**26.** 2000 − 561	**27.** 3002 − 499

WRITTEN EXERCISES

85. Subtract and test:

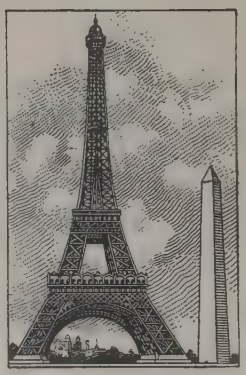
1. 506 − 341	**2.** 4642 − 2925	**3.** 7050 − 4182	**4.** 5236 − 3841
5. 725 − 486	**6.** 8000 − 547	**7.** 1791 − 384	**8.** 1920 − 981
9. 304 − 125	**10.** 6208 − 1432	**11.** 4281 − 3462	**12.** 5007 − 2574
13. 981 − 587	**14.** 8796 − 4321	**15.** 3642 − 2975	**16.** 9700 − 1811
17. 613 − 408	**18.** 2790 − 1882	**19.** 7849 − 2994	**20.** 5555 − 3678

WRITTEN EXERCISES

86. 1. Mr. Pond's salary is $ 864 a year and his expenses are $ 598. How much money does he save each year?

MODEL SOLUTION

$ 864, salary
$ 598, expenses
$ 266, savings



2. The Eiffel Tower is 984 ft. high and the Washington Monument 555 ft. high. How much higher is the tower than the monument?

3. From a box containing 360 lemons a fruit dealer sold 156. How many of the lemons were left?

4. A loaded wagon weighed 3678 lb., and the wagon alone weighed 1235 lb. How much did the load weigh?

5. There are 75 eggs in a box. How many will be left after 4 dozen of them are sold?

6. How much change should Mrs. Bell receive out of a dollar, if she buys apples for 25 ¢ and potatoes for 39 ¢?

7. A man who had $ 5750 bought a house for $ 2425. How much money had he left?

8. From 4 cases of canned tomatoes containing 24 cans each, 49 cans were sold. How many were left?

9. While coasting, Floyd's sled went 716 ft. and Roy's 674 ft. How much farther did Floyd's sled go than Roy's?

ROMAN NUMERALS

87. 1. You have learned that the Romans wrote numbers with letters. These letters are called **Roman numerals.**

2. There are seven Roman numerals. Only three have been used so far. Can you tell which they are?

3. I stands for 1. V stands for 5. X stands for 10.

4. When the Romans wrote 2, they used *two* I's, II.

5. When they wrote 3, they used *three* I's, III.

6. 4 is 1 less than 5, or 1 *before* 5, so for 4 the Romans wrote I *before* V, IV. Sometimes they wrote it, IIII.

7. 6 is 5 and 1, or 1 *after* 5, so for 6 they wrote I *after* V in this way: VI.

8. 7 is 2 after 5. They wrote 7 this way: VII.

9. 8 is 3 after 5. They wrote 8 this way: VIII.

10. 9 is 1 before 10. This is the way they wrote 9: IX.

11. What Roman numeral is on a 5-dollar bill? on a 10-dollar bill? Where have you seen Roman numerals?

88. 1. 11 equals 10 and 1, or 1 after 10.

2. How do you think the Romans wrote 11? Read XI.

3. Using Roman numerals, write: 12; 13.

4. 14 equals 10 and 4. How did the Romans write 10? 4? How do you think they wrote 14?

5. Read: XIV; XII; XIII; XV; XVI; XVIII; XVII.

6. How did the Romans write 10 and 9, or 19? Read XIX.

7. Write the first 19 numbers with Roman numerals.

89. 1. How many 10's are there in 20? How many X's are needed to write 20? Write 20 with letters.

2. Read: XXII; XXIV; XXV; XXVI; XXIX.

3. How many 10's are there in 30? Write 30 with letters.

4. Use letters to write all the numbers from 20 to 39.

90. 1. The Roman numeral that stands for 50 is L.

2. 40 is 10 *before* 50. What two letters are used to write 40? Which one is written *before* the other? Write 40.

3. Arrange the same letters so that they will stand for 60.

4. Read: XLI; LIV; XLVII; LV; LXV; LXIX.

5. Write with letters the numbers from 40 to 69.

91. 1. Write the letter that stands for 50, and just after it write the letters that stand for 20.

2. How many are 50 and 20? Read LXX.

3. How many are 50 and 30? Read LXXX.

4. Use letters to write the numbers from 75 to 85.

5. Read: LXXII; LXXXVII; LXXIV; LXXXIX.

92. 1. The letter C stands for 100, D for 500, M for 1000.

2. 90 is 10 *before* 100. Read XC; XCII; XCIX.

3. Write the following, using Roman numerals:

53	88	73	38	56	91	79	500
92	46	66	81	24	34	97	1000

4. Read the following:

MC	XLIII	LXVI	XCVII	XXVIII
DCC	XCVII	XXXII	LXXXI	LXXXIX

NUMBERS TO SEVENTY

93. Counting by sixes.

Here is a picture of some daffodils. The parts of each flower extending outward from the center are sepals.

1. How many sepals has 1 daffodil? How many have 2 daffodils? 3 daffodils? 4 daffodils?

2. Tulips, also, have 6 sepals. How many sepals have 5 tulips? 6 tulips? 7 tulips? 8 tulips? 9 tulips? 10 tulips?

3. When asparagus is not cut off to eat, it grows tall and bears red berries, each containing 6 seeds.

How many seeds are there in 2 berries? in 3 berries?

4. How many seeds are 4 times 6 seeds? 5×6 seeds? 6×6 seeds? 7×6 seeds? 8×6 seeds? 9×6 seeds? 10×6 seeds?

5. Count these squares by 6's in columns.

How many squares are there? Test your answer by counting them by 10's in rows.

1									
2									
3									
4									
5									
6	12	18							

6. Count by 6's in this way: "*Once* 6 is 6, *two* times 6 are 12, *three* times 6 are 18," and so on.

Continue to *ten* times 6.

7. Memorize this **table of sixes**:

$1 \times 6 = 6$	$6 \times 6 = 36$
$2 \times 6 = 12$	$7 \times 6 = 42$
$3 \times 6 = 18$	$8 \times 6 = 48$
$4 \times 6 = 24$	$9 \times 6 = 54$
$5 \times 6 = 30$	$10 \times 6 = 60$

8. The numbers 6, 12, 18, etc., are called **multiples** of 6, because each is produced by multiplying 6 by some number.

Write the first ten multiples of 6 in a row.

9. Draw an oblong 10 inches by 6 inches and divide it into inch squares. Counting the squares by 6's, write the multiples of 6 in the bottom row, as shown in exercise 5.

10. How many 6's are there in 12? in 18? in 24? in 30? in 48? in 60? in 42? in 54?

11. Copy, complete, and read:

$6 \div 6 =$ $18 \div 6 =$ $30 \div 6 =$ $42 \div 6 =$ $54 \div 6 =$

$12 \div 6 =$ $24 \div 6 =$ $36 \div 6 =$ $48 \div 6 =$ $60 \div 6 =$

12. Look at the first 12 squares that you have counted. They are arranged in 2 columns of —— squares each. $\frac{1}{2}$ of 12 squares = —— squares. $\frac{1}{2}$ of $12 = ?$

13. In the same way find $\frac{1}{3}$ of 18; $\frac{2}{3}$ of 18; $\frac{1}{4}$ of 24; $\frac{2}{4}$ of 24; $\frac{3}{4}$ of 24; $\frac{1}{5}$ of 30; $\frac{1}{6}$ of 36.

EXERCISES

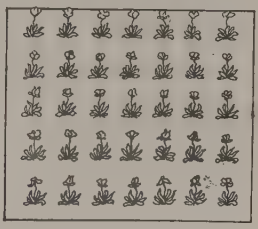
94. Answer quickly, reading across the page:

1. $2 \times 6 =$ $6 \times 2 =$ $12 \div 6 =$ $12 \div 2 =$ $\frac{1}{2}$ of $12 =$
2. $4 \times 6 =$ $6 \times 4 =$ $24 \div 6 =$ $24 \div 4 =$ $\frac{1}{4}$ of $24 =$
3. $5 \times 6 =$ $6 \times 5 =$ $30 \div 6 =$ $30 \div 5 =$ $\frac{1}{5}$ of $30 =$
4. $3 \times 6 =$ $6 \times 3 =$ $18 \div 6 =$ $18 \div 3 =$ $\frac{1}{3}$ of $18 =$

Supply the missing numbers:

5.	$6 \times 6 = ?$	$36 \div 6 = ?$	$\frac{1}{6}$ of $36 = ?$
6.	$18 \div ? = 6$	$18 \div ? = 9$	$? = 7 \times 6$
7.	$10 \times ? = 60$	$9 \times ? = 54$	$\frac{1}{2}$ of $? = 6$
8.	$24 \div 8 = ?$	$30 = ? \times 6$	$\frac{1}{3}$ of $? = 6$
9.	$? \times 6 = 30$	$40 = ? \times 5$	$6 = \frac{1}{4}$ of $?$
10.	$7 \times ? = 42$	$60 = 10 \times ?$	$6 = \frac{1}{5}$ of $?$

95. Counting by sevens.



1. Here is a picture of Flora's bed of tulips.

How many tulips are there in the first horizontal row? in each row?

2. Count the tulips by 7's.

How many are $7+7$, or *two* 7's? $7+7+7$, or *three* 7's? four 7's? five 7's?

3. How many tulips has Flora? How many tulips would she have, if she had 1 more row of 7 tulips?

$5 \times 7 = ?$ $35+7 = ?$ $6 \times 7 = ?$

4. How many tulips are 6 times 7 tulips and 7 more tulips?

$6 \times 7 = ?$ $42+7 = ?$ $7 \times 7 = ?$

5.	$49 =$ —— 7's	$49+7 =$ —— 7's	$49+7 = ?$	$8 \times 7 = ?$
6.	$56 =$ —— 7's	$56+7 =$ —— 7's	$56+7 = ?$	$9 \times 7 = ?$
7.	$63 =$ —— 7's	$63+7 =$ —— 7's	$63+7 = ?$	$10 \times 7 = ?$

8. Count rapidly by 7's from 0 to 70.

9. Count by 7's to 70 in this way: "*Once* 7 is 7; *two* times 7 are 14;" and so on.

10. Count by 7's to 70 in this way: "In 7 there is *one* 7; in 14 there are *two* 7's;" and so on.

11. How many days are there in 1 week? in 2 wk.? in 3 wk.?

12. In 4 weeks there are 4 times 7 days, or —— days.

In the same way tell how many days there are in 5 wk.; in 6 wk.; in 7 wk.; in 8 wk.; in 9 wk.; in 10 wk.

13. How many weeks are there in 7 days? in 14 days?

21 days = —— weeks.

28 days = —— weeks.

Continue in this way to 70 days = —— weeks.

14. Memorize:

$1 \times 7 = 7$	$6 \times 7 = 42$
$2 \times 7 = 14$	$7 \times 7 = 49$
$3 \times 7 = 21$	$8 \times 7 = 56$
$4 \times 7 = 28$	$9 \times 7 = 63$
$5 \times 7 = 35$	$10 \times 7 = 70$

15. Copy, complete, and read:

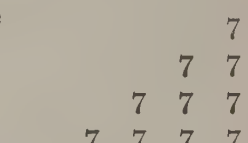
$7 \div 7 =$	$42 \div 7 =$
$14 \div 7 =$	$49 \div 7 =$
$21 \div 7 =$	$56 \div 7 =$
$28 \div 7 =$	$63 \div 7 =$
$35 \div 7 =$	$70 \div 7 =$

16. Copy the columns of 7's and write the sums beneath.

Compare 14 and 7 thus:

14 = —— × 7; 7 = —— of 14.

17. In the same way compare 21 and 7; 28 and 7; 35 and 7.



18. Find $\frac{2}{3}$ of 21; $\frac{2}{4}$ of 28; $\frac{3}{4}$ of 28; $\frac{2}{5}$ of 35.

EXERCISES

96. Tell the number of 7's in the sum, then tell the sum:

1. $7+7=$
2. $7+7+7+7=$
3. $7+7+7=$
4. $7+7+7+7+7=$
5. $7+7+7+7+7+7=$
6. $14+7+7+7=$
7. $21+7+7+7+7=$
8. $35+7+7+7+7+7=$

9. Tell the missing numbers in this mixed table of 7's:

——— × ——— = 35	——— × ——— = 70
= 21	= 7
= 42	= 63
= 56	= 28
= 14	= 49

Answer quickly, reading across the page:

10.	$2\times7=$	$7\times2=$	$14\div7=$	$14\div2=$	$\frac{1}{2}$ of $14=$
11.	$4\times7=$	$7\times4=$	$28\div7=$	$28\div4=$	$\frac{1}{4}$ of $28=$
12.	$6\times7=$	$7\times6=$	$42\div7=$	$42\div6=$	$\frac{1}{6}$ of $42=$
13.	$3\times7=$	$7\times3=$	$21\div7=$	$21\div3=$	$\frac{1}{3}$ of $21=$
14.	$5\times7=$	$7\times5=$	$35\div7=$	$35\div5=$	$\frac{1}{5}$ of $35=$

15. When you can buy 7 marbles for a cent, how many can you buy for 5 cents? for 8¢? for 10¢?

16. Julia bought 4 pounds of rice at 7 cents a pound. How much did the rice cost her?

17. If a pound of almonds costs 28 cents, what part of a pound can you buy for 7 cents?

EXERCISES

97. 1. Give the table of 2's to 10 times 2.

2. How many are five 2's? seven 2's? 4×2? 9×2? $12 \div 2$? $16 \div 2$? How many 2's are there in 14? in 18?

3. Give the table of 4's to 10 times 4.

4. How many are two 4's? six 4's? 5×4? 10×4? $12 \div 4$? How many 4's are there in 16? in 32? in 36?

Tell the missing numbers:

5. Multiples of 3

$15 = 5 \times 3$	$24 =$
$9 =$	$12 =$
$21 =$	$6 =$
$3 =$	$27 =$
$18 =$	$30 =$

6. Multiples of 6

$30 = 5 \times 6$	$48 =$
$18 =$	$24 =$
$42 =$	$12 =$
$6 =$	$54 =$
$36 =$	$60 =$

7. How many 3's are there in 6? in 2×6? in 5×6?

8. Give the table of 5's to 10 times 5.

9. How many are 2×5? 4×5? 8×5? 9×5? How many are $\frac{1}{5}$ of 35? $\frac{1}{5}$ of 15? $\frac{1}{5}$ of 50?

10. Give the table of 7's to 10 times 7.

11. How many are 7×7? 3×7? 9×7? $42 \div 7$? $35 \div 7$?

12. How many dots are 8 times 4 dots? 4 times 8 dots? What is the product of 4 and 8? $8 \times 4 = ?$ $4 \times 8 = ?$

13. In a similar way find the product of 5 and 8; of 5 and 9; of 6 and 8; of 6 and 9; of 6 and 10.

6 times $8 = ?$ 6 times $9 = ?$ 6 times $10 = ?$

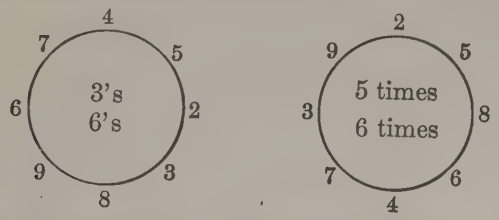
14. Find the product of 7 and 8; of 7 and 9.

7 times 8 = ? 7 times 9 = ? 7 times 10 = ?

15. Copy and complete as in the first column:

$2 \times 8 = 8 \times 2 = 16$	$5 \times 8 =$	$2 \times 9 =$	$5 \times 9 =$
$3 \times 8 =$ —— $=$	$6 \times 8 =$	$3 \times 9 =$	$6 \times 9 =$
$4 \times 8 =$ —— $=$	$7 \times 8 =$	$4 \times 9 =$	$7 \times 9 =$

16. See how rapidly you can go around the first ring, naming the multiples of 3 without making a mistake. Begin with any number and go in either direction.



17. Give the multiples of 6 in the same way.

18. Give the multiples of 3 and 6 in pairs, beginning at the top of the circle, thus:

12, 24; 15, 30; 6, 12; and so on.

19. See how rapidly you can go around the second ring, multiplying by 5; by 6.

20. Next multiply each number around the second ring by 5 and 6 in succession, beginning at the top, thus:

10, 12; 25, 30; 40, 48; and so on.

21. Tell products rapidly:

8	7	5	7	9	8	7	6
5	6	9	7	6	7	9	8

22. Helen, Arthur, and I have 21 cookies in our lunch basket. How many are there for each of us?

23. One day every week Helen dusts 4 rooms for her mother. How long does it take her, if she spends 10 minutes dusting each room?

How many such rooms could Helen dust in an hour?

24. Arthur carries in the wood for the kitchen range, 6 sticks at a time. How many trips does he make to carry in 30 sticks? 48 sticks?

25. Every Saturday I fill the coal box. It holds 24 hods of coal. I draw it from the coal shed on my sled, 3 hods full at a time. How many sled loads does it take to fill the coal box?

26. We get the morning paper 6 days a week and Helen pays for it every Monday morning. It costs 3 cents a day. How much does she pay for it per week?

27. We pay the milkman every Wednesday morning for 7 quarts of milk at 6 cents a quart. How much does milk cost us a week?

28. On Friday our cook bakes 4 pans of rolls, with 9 rolls in each pan. How many rolls does she bake?

29. We have 8 flatirons at our house. Each weighs 7 pounds. How much do all weigh?

30. In a catalogue I found these prices for flatirons:

Weight,	4 lb.,	5 lb.,	6 lb.,	7 lb.,	8 lb.,	9 lb.,	10 lb.
Price,	20¢,	25¢,	30¢,	35¢,	40¢,	45¢,	50¢.

How much do flatirons cost a pound?

98. Inexact division.

EXERCISES

1. Find the value of $7+7+7+2$.

Think "Three 7's and 2; 21 + 2; 23." Name the sum, 23.

Find the value of:

2. $5+5+2$
3. $2+2+2+1$
4. $4+4+4+3$
5. $6+6+2$
6. $3+3+3+1$
7. $6+6+6+2$
8. $5+5+5+5+4$
9. $6+6+6+6+5$
10. $7+7+7+7+2$
11. $2+2+2+2+2+2+1$

12. Frank bought eight 4-cent stamps and a 2-cent stamp. How much money did he expend for stamps?

13. A girl had seven 5-cent pieces and a 1-cent piece in her purse. How much money had she in her purse?

14. Andrew bought 9 pencils at 3 cents apiece and had 4 cents left. How much money had he at first?

Find the value of:

15. $5+5+5+5+5+3$
16. $4+4+4+4+4+1$
17. $6+6+6+6+6+3$
18. $7+7+7+7+7+4$
19. $6+6+6+6+5$
20. $10+10+10+10+2$
21. $1+7+7+7+7$
22. $2+6+6+6+6+6$
23. $3+4+4+4+4+4$
24. Nine 2's and 1
25. Seven 3's and 2
26. Six 7's and 5
27. Eight 3's and 1
28. Nine 4's and 2
29. Seven 5's and 1
30. Eight 6's and 5
31. Ten 5's and 3
32. Nine 7's and 6

EXERCISES

99. 1. Find the value of $26-4-4-4-4-4-4$.

Think "26 less six 4's; $26-24$; 2." Name the remainder, 2.

Find the value of:

2. $11-5-5$	5. $18-5-5-5$	8. $19-$ six 3's
3. $8-3-3$	6. $20-6-6-6$	9. $39-$ nine 4's
4. $17-7-7$	7. $19-4-4-4$	10. $35-$ three 10's

11. How many are $13-4$? $13-4-4$? $13-4-4-4$?

12. What is the greatest number of 4's contained in 13, and what is the remainder?

12 = three 4's. $13-12=1$. 13 = three 4's and 1 over.

Read, filling blanks:

13. In 8 there are —— 3's and —— over.

14. In 19 there are —— 2's and —— over.

15. In 21 there are —— 4's and —— over.

16. In 32 there are —— 5's and —— over.

17. 5 is contained in 26 —— times and —— over.

18. 4 is contained in 41 —— times and —— over.

19. $30\div6=$ ——; $31\div6=$ —— and —— over.

20. $20\div4=$ ——; $23\div4=$ —— and —— over.

21. $2\overline{)11}$
— and — over.

22. $7\overline{)36}$
— and — over.

23. $3\overline{)26}$
— and — remainder.

24. $5\overline{)46}$
— and — remainder.

Find quotients and remainders:

25. $2\overline{)9}$	30. $5\overline{)12}$	35. $3\overline{)28}$	40. $6\overline{)57}$
26. $3\overline{)16}$	31. $3\overline{)23}$	36. $6\overline{)65}$	41. $8\overline{)25}$
27. $4\overline{)18}$	32. $6\overline{)26}$	37. $7\overline{)16}$	42. $5\overline{)33}$
28. $2\overline{)17}$	33. $4\overline{)38}$	38. $4\overline{)27}$	43. $9\overline{)19}$
29. $4\overline{)21}$	34. $3\overline{)32}$	39. $7\overline{)25}$	44. $10\overline{)75}$

45. Divide by 3, 4, and 6, naming quotients and remainders: 7, 14, 19, 22, 10, 17, 25, 11, 31, 29.

46. Divide by 5, 7, and 10, naming quotients and remainders: 11, 17, 23, 29, 13, 44, 38, 43, 27, 48.

WRITTEN EXERCISES

100. 1. A boy bought 9 oranges at 4 cents each and had 14 cents left. How much money had he at first?

4¢ for 1 orange	1 orange cost 4¢.
9	9 oranges cost 9 times 4¢, or 36¢.
36¢ for 9 oranges	9 times 4¢ and 14¢ over is equal
14¢ left	to 36¢ + 14¢, or 50¢.
50¢ at first	He had 50¢ at first.

2. Robert bought 3 school papers at 10 cents each and had 5 cents left. How much money had he at first?

3. Grace bought 4 dolls' beds at 8 cents each and had 12 cents left. How much money had she at first?

4. I have 1 cent more money than I need to buy seven 5-cent pencils. How much money have I?

5. Percy has 36 cents. How many 5-cent Christmas toys can he buy, and how much money will he have left?

$5¢)\underline{36¢}$
7 times, $1¢$ over
7 tops, $1¢$ over.

The number of toys he can buy is the same as the number of times $36¢$ contains $5¢$.

$36¢$ contains $5¢$ 7 times with $1¢$ over. He can buy 7 toys, and will have $1¢$ left.

6. Frank has 55 cents and wishes to buy Christmas toys costing 10 cents each. How many can he buy? How much money will he have left?

7. Alfred has 45 cents. How many rubber balls can he buy for his brother, and how much money will he have left, if he buys as many 4-cent balls as he can? 7-cent balls?

8. If Helen has 30 cents and buys 4 Christmas presents at 7 cents each, how much money will she have left?

9. Belle's mother bought 5 dozen Christmas candles at 6 cents a dozen and gave the dealer 35 cents. How much change was due her?

10. Eva has 35 cents and wishes to buy 6 yards of tinsel for a Christmas tree. How much money will she have left, if she pays 4 cents a yard? 5 cents a yard? How much more money does she need to buy the 6-cent kind?

11. Mabel expended 47 cents for 6 dolls and a tea set. If each doll cost 7 cents, how much did the tea set cost?

12. John bought a toy locomotive for 40 cents and 4 cars at 9 cents each. Find the cost of the train.

MULTIPLICATION

EXERCISES

101. Multiply at sight:

1.	4	3	2	7	6	4	5	2
	5	6	9	3	4	9	7	10
2.	40	30	50	60	70	20	40	30
	2	5	3	7	2	9	4	6

3. David has four 5-cent coins in his bank. How much less than a quarter of a dollar has he?

4. Joseph has nine 5-cent pieces in his bank and 8 cents besides. How much money has he?

5. Which costs more and how much more, a 50-cent tool chest or 8 carnelian marbles at 7 cents each?

6. How many dimes are 6 times 3 dimes and 2 dimes more?

How many tens are 6 times 3 tens and 2 tens more?

7. How many tens are 7 times 6 tens and 4 tens more?

8. How many hundreds are 7×500 and 200 more?

Multiply:

9.	4	40	44	700	700 + 40	740	744
	2	2	2	2	2	2	2
10.	2	50	52	400	400 + 50	450	452
	3	3	3	3	3	3	3

WRITTEN EXERCISES

102. 1. Multiply 756 by 5.

$$\begin{array}{r} 756 \\ \times\ 5 \\ \hline 3780 \end{array}$$

5 times 6 = 30. Write 0.
5 times 5 = 25, 25 + 3 = 28.
Write 8 before the 0.
5 times 7 = 35, 35 + 2 = 37.

Write 37 before the 8. Read the product.

Test your answer by adding five 756's.
In the following exercises, test the answers for the first row.

Multiply:

2. 627 × 2	3. 762 × 3	4. 250 × 4	5. 84 × 3	6. 288 × 2
7. 851 × 2	8. 96 × 4	9. 807 × 5	10. 85 × 7	11. 344 × 3
12. 176 × 2	13. 555 × 4	14. 89 × 6	15. 625 × 4	16. 506 × 7
17. 760 × 7	18. 389 × 2	19. 578 × 3	20. 444 × 6	21. 757 × 6
22. 518 × 3	23. 98 × 5	24. 770 × 4	25. 543 × 7	26. 444 × 7
27. 125 × 7	28. 609 × 4	29. 99 × 6	30. 666 × 5	31. 999 × 5

EXERCISES

103. 1. If you live 7 blocks from the schoolhouse and can walk a block in 2 minutes, in how many minutes can you walk to school? At what time must you start to reach school at five minutes to nine, or at 9:55?

2. When we ride behind our horse, Jim, he trots 7 miles an hour. How far can we ride in 5 hours?

3. Lucy sailed on a steamboat for 4 hours. If the steamboat went 12 miles an hour, how far did Lucy sail?

4. If each of 7 children drops 5 cents into a slot machine, how much money do they all drop in?

5. If there are 8 rows of desks in a class room and 6 desks in each row, how many children will the room seat?

6. How far can you ride in 6 hours on a train that goes at the rate of 40 miles an hour?

Find the change out of a quarter of a dollar for each of the following purchases:

7. 7 newspapers at 2¢ each; at 3¢ each.

8. 4 calendars at 3¢ each; at 5¢ each.

9. 30 rubber bands at 3 for 1¢; at 6 for 1¢.

10. 4 papers of pins at 5¢ a paper; at 6¢ a paper.

11. Find the cost of 4 pounds of sugar at 6 cents a pound and a pound of ham, 20 cents.

12. At the baker's I bought 3 cakes at 20¢ each and a pie for 10¢. How much money did I spend there?

WRITTEN EXERCISES

104. 1. A grocer bought three boxes of lemons. There were 360 lemons in each box. How many lemons did he buy?

360 lemons
3
1080 lemons

He bought 3 times 360 lemons, or 1080 lemons.

2. At the fruit store Caroline saw 4 boxes of oranges with "150" stamped on the end of each box, showing that each box contained 150 oranges. How many oranges did the 4 boxes contain?

3. A fruit dealer bought 2 car loads of oranges. There were 362 boxes in each car. How many boxes of oranges did he buy?

4. How many pineapples are there in three crates, if two of them contain 24 each and the third contains 36?

5. Hope bought 2 pounds of coffee at 35¢ a pound and gave the grocer $1. How much change was due her?

35¢ for 1 lb.
2
70¢ for 2 lb.

$1 = 100¢
−70¢
30¢, change due

6. A woman bought 3 pounds of butter at 28¢ a pound and paid the dealer $1. Find the change due her.

7. A man bought 6 pounds of beef for roasting at 14¢ a pound. How much had he left out of $1?

Find the change out of a dollar for each purchase:

8. 2 pounds of tea at 42 cents a pound.

9. 5 pounds of beefsteak at 18 cents a pound.

10. 7 bunches of celery at 14 cents a bunch.

11. 6 pounds of cheese at 15 cents a pound.

12. 4 dozen bananas at 22 cents a dozen.

13. 3 pounds of butter at 32 cents a pound.

14. A flour barrel holds 196 pounds of flour. How many pounds of flour will 5 such barrels hold?

15. A small bag of dairy salt holds 56 pounds, and a large bag holds 4 times as much. How much more does a large bag hold than a small one?

16. How much more than half a dollar is needed to buy 5 dozen ears of sweet corn at 13 cents a dozen?

17. Saturday morning our grocer had 2 whole cheeses, weighing 40 pounds each, and 25 pounds of another cheese. How many pounds of cheese had he?

Find the amount of the purchases at each store:

18. At the hardware store, 2 cans of paint at 30 cents a can and a paint brush for 35 cents.

19. At the drygoods store, 5 yards of ribbon at 15 cents a yard and a 25-cent handkerchief.

20. At the florist's, a bunch of violets for 50 cents and 3 roses at 15 cents each.

21. At the bookstore, a 25-cent book and 2 boxes of note paper at 35 cents a box.

DIVISION

EXERCISES

105. Divide at sight:

1.	2)10	3)18	4)24	5)35	6)48	7)28
2.	3)27	9)45	7)42	8)32	5)45	4)16
3.	2)46	3)960	5)500	4)480	6)66	7)707

Tell quotients and remainders:

4.	5.	6.	7.	8.	9.
2)20	2)21	2)44	2)45	3)18	3)19
10.	**11.**	**12.**	**13.**	**14.**	**15.**
4)45	4)83	5)50	5)53	5)57	6)68
16.	**17.**	**18.**	**19.**	**20.**	**21.**
3)360	3)362	4)485	5)506	5)559	6)668

22. How many weeks are there in 63 days?

23. How many weeks are there in a month of 31 days, and how many days over?

24. If 45 boys march 4 abreast, how many rows will there be and how many boys over?

25. How many gallons are there in 36 quarts?

26. If Richard can skate around a pond in 10 minutes, how many times can he skate around it in half an hour?

Divide rapidly:

27.	3)6	3)60	3)66	3)666	3)6666
28.	6)12	6)120	6)1200	6)1206	6)1266
29.	3)21	3)219	3)2190	3)2196	3)2197

WRITTEN EXERCISES

106. 1. Divide 2197 by 3.

3)2197
732, 1 remainder

3 is contained in 21 (hundreds), 7 (hundreds) times. Write 7 under 1, in hundreds' place.

3 is contained in 9 (tens), 3 (tens) times. Write 3 under 9, in tens' place. 3 is contained in 7, 2 times with 1 remainder. Write 2 under 7, in units' place.

After 2 write a comma and then "1 remainder."

Test. — If the answer is correct, then 3 times 732 and 1 more should give 2197. Test it by multiplying 732 by 3 and adding 1.

Do not write 732 and 3 again, but look at the process and note that $3 \times 2 = 6$ and $6 + 1 = 7$, which gives the units of 2197; 3×3 tens $= 9$ tens, the tens of 2197; 3×7 hundreds $= 21$ hundreds, the hundreds of 2197.

Divide and test:

2.	3.	4.	5.	6.
2)1485	3)1565	2)1667	3)2468	4)1649
7.	8.	9.	10.	11.
5)1557	4)2043	5)2059	3)1861	4)1282
12.	13.	14.	15.	16.
6)307	4)325	3)2737	5)4052	5)4558

17. Divide each of these numbers by 2:
126, 185, 208, 405, 4248, 6265, 1400, 1483.

18. Divide each of these numbers by 3; also by 6:
126, 185, 248, 306, 367, 6605, 2400, 2461.

19. Divide each of these numbers by 5:
100, 105, 108, 1000, 1055, 5508, 4057, 3006.

Divide and test:

20.	21.	22.	23.	24.
4)843	3)1290	5)1500	4)287	6)421
25.	**26.**	**27.**	**28.**	**29.**
7)144	6)549	6)4262	5)259	4)8004
30.	**31.**	**32.**	**33.**	**34.**
3)9301	2)4621	7)2175	4)165	7)1403
35.	**36.**	**37.**	**38.**	**39.**
5)157	4)3606	7)5672	5)358	6)5409

EXERCISES

107. 1. 10¢ = —— times 2¢; 2¢ = —— of 10¢.

In the same way compare:

2. 12¢ and 3¢.
3. 15¢ and 5¢.
4. 18 eggs and 3 eggs.
5. 10 hats and 5 hats.
6. 8 sleds and 16 sleds.
7. 12 tops and 4 tops.
8. 15 apples and 3 apples.
9. 1 quart and 1 gallon.
10. 1 foot and 1 yard.
11. $20 and $5.
12. $20 and $4.
13. 1 pound and 8 ounces.

14. If 2 lemons cost 5 cents, how much will 6 lemons cost at the same price?

MODEL SOLUTION

2 lemons cost 5¢.
6 lemons are 3 times 2 lemons.
6 lemons will cost 3 times 5¢, or 15¢.

15. If 4 peaches cost 5 cents, how much will 12 peaches cost at the same price?

16. If 2 pairs of shoe laces cost 5 cents, how much will 8 pairs cost at the same price?

17. If you can walk 3 miles in 2 hours, how far can you walk in 4 hours at the same rate?

18. If a dozen oranges cost 30 cents, how much will 4 oranges cost at the same price?

MODEL SOLUTION

12 oranges cost 30 cents.
4 oranges are $\frac{1}{3}$ of 12 oranges.
4 oranges will cost $\frac{1}{3}$ of 30¢, or 10¢.

19. If a dozen eggs cost 32 cents, how much will 3 eggs cost at the same price?

Find the cost of:

20. 4 buns at 18 cents a dozen.

21. 21 plums at 3 plums for 5 cents.

22. 48 pears at 6 pears for 5 cents.

23. 6 bananas at 22 cents a dozen.

24. 36 marbles at 4 marbles for 5 cents.

Find the cost of:

25. 6 pounds of grapes at 2 lb. for 15¢.

26. 8 boxes of berries at 4 boxes for 25¢.

27. 3 cans of tomatoes at 12 cans for $1.

28. 2 packages of oatmeal at 8 packages for $1.

29. 18 cakes of soap at 6 cakes for a quarter dollar.

30. If a street car runs 6 blocks in 5 minutes, how far will it run in 20 minutes? Suppose it runs 7 blocks in 5 minutes; 8 blocks in 5 minutes.

WRITTEN EXERCISES

108. 1. How many chairs at $2 each can be bought for $120? for $75, with how many dollars over?

2. A blacksmith has 162 horseshoes. How many horses can he shoe with 4 shoes each? How many shoes will be left?

3. A furniture dealer paid $2460 for beds at $6 each. How many did he buy?

4. If 2000 soldiers march 8 abreast, how many rows of 8 soldiers will there be?

5. A certain church will hold 420 persons, if 6 persons sit in each pew. How many pews are there?

6. Three of the rows of trees in a large orchard contain 1500 peach trees, each row containing the same number of trees. How many trees are there in each row?

7. In a fire drill 365 children marched out of the school building 2 abreast. How many rows of children were there and how many over?

VOLUME

109. 1. How many corners has a cube? how many edges?

How do the edges of a cube compare in length?

2. How many flat sides, or *faces*, has a cube? How do they compare in shape? Are they squares or oblongs?

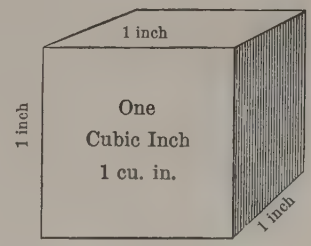
How do the faces of a cube compare in area?

3. How long is the front face of this cube? how wide?

4. What is the area of the front face of this cube?

What is the area of each face?

5. Each face of this cube is a *square inch*.



6. A cube whose faces are each a *square inch* is called a **cubic inch.**

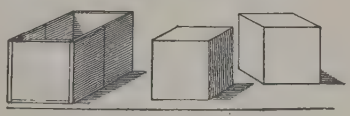
7. How long is a cubic inch? how wide? how high?

8. If each face of the cube were a *square foot*, what would the cube be called?

9. How long is a cubic foot? how wide? how high?

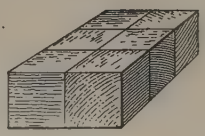
110. 1. The box in the picture is 2 inches long, 1 inch wide, and 1 inch deep (measured on the inside).

How many cubic-inch blocks will the box hold?



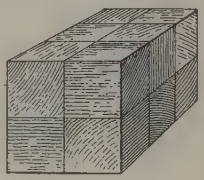
2. If this box were 1 inch longer than it is, how many cubic-inch blocks would it hold?

3. Place 3 cubic-inch blocks in a *row;* then, 3 blocks more in another row, and put these rows side by side as in this picture.



How many times 3 cubic inches do you see in the picture? how many cubic inches?

4. Arrange another *layer* of cubic-inch blocks like the one in the first picture and put one layer on top of the other as in this picture.



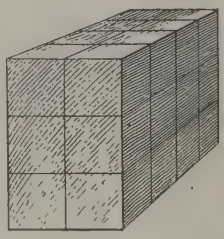
How many times 3 blocks are there in each layer? How many times 2×3 blocks are there in the pile?

There are 2×3 blocks in a layer and 2 times 2×3 blocks, or —— blocks, in the pile.

5. How long is the pile? how wide? how high?

6. How many cubic-inch blocks are there in a pile 3 inches long, 2 inches wide, and 2 inches high?

7. Here is a picture of a block of wood 4 inches long, 2 inches wide, and 3 inches high. It is marked to show cubic inches.



How many cubic inches are there in a row running the longest way? in 2 rows, or 1 layer?

How many cubic inches are there in 2 layers? in 3?

How many cubic inches does the block contain?

3 times 2×4 cubic inches are —— cubic inches.

8. A block is 5 in. long, 4 in. wide, and 3 in. high. Find how many cubic inches it contains.

Think of rows and layers of cubic inches.

In 1 row there are 5 cubic inches.

In 1 layer there are 4×5 cu. in., or —— cu. in.

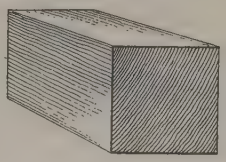
In 3 layers there are 3 times 4×5 cu. in., or —— cu. in.

Then the block contains —— cu. in.

9. This is called the **volume** of the block.

WRITTEN EXERCISES

111. 1. Find the volume of a block 4 in. long, 2 in. wide, and 2 in. high.



2. A box (measured inside) is 4 in. long, 3 in. wide, and 3 in. deep. How many cubic inches of sand will it hold?

3. How many cubic inches does a cube contain, if its edges are 3 in. long? What is the area of its surface?

Such a cube is called a 3-*inch cube*. What is a 5-inch cube? a 2-foot cube?

4. In loading a wagon with clay a man dug a hole 6 ft. long, 2 ft. wide, and 2 ft. deep. How many cubic feet of clay did he put into his wagon?

5. How many cubic feet of water will a tank hold, if it is 5 ft. long, 4 ft. wide, and 4 ft. deep, inside?

6. Find the volume of a 4-foot cube of granite. Find the area that is polished, if 5 of its faces are polished.

COMPARISON OF MEASURES

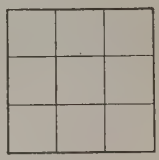
EXERCISES

112. 1. How many inches are there in a foot? in $\frac{1}{2}$ ft.? in $\frac{1}{3}$ ft.? in $\frac{2}{3}$ ft.? in $\frac{1}{4}$ ft.? in $\frac{3}{4}$ ft.?

2. How many feet are there in 1 yd.? how many inches? How many feet are there in $\frac{1}{3}$ yd.? how many inches? What part of a yard is 2 feet? 24 inches?

3. Which is longer, and how much, 8 ft. or 3 yd.? 2 ft. or 22 in.? 6 yd. or 17 ft.?

4. This picture shows a square yard divided into square feet. How many square feet are there in 1 sq. yd.? in $\frac{1}{3}$ sq. yd.? What part of a square yard is 6 sq. ft.?



5. How many pints are there in 1 qt.? in 4 qt.? in 1 gal.? What part of a gallon is 1 qt.? 2 qt.? 3 qt.? 2 pt.? 4 pt.? 6 pt.?

6. Which is greater, 1 gal. or 7 pt.? 2 gal. or 18 pt.?

7. How many ounces are there in a pound? in $\frac{1}{2}$ lb.? What part of a pound is 4 ounces? 12 ounces?

8. How much heavier is 35 ounces than 2 pounds? how much lighter than $2\frac{1}{2}$ pounds?

9. How many months are there in a year? What part of a year is 6 months? 3 mo.? 9 mo.? 4 mo.? 8 mo.?

10. Flora spent June, July, and August in the country. What part of the year was she in the country?

11. What part of 28 days is 1 week?

12. Jennie had 3 weeks' vacation, and Mary had 24 days. Which girl had the longer vacation? how many days longer?

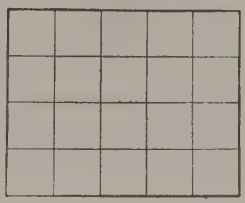
13. How many hours are there in a day? in $\frac{1}{2}$ of a day? in $\frac{1}{4}$ of a day? in $\frac{3}{4}$ of a day?

What part of a day is 8 hours? 16 hours?

14. Florence spends 6 hours of the day in school. What part of the day is she in school?

15. How many minutes are there in $\frac{1}{4}$ hr.? in $\frac{1}{2}$ hr.? in $\frac{3}{4}$ hr.?

113. 1. Each square here represents a square inch. How many square inches are there in the oblong? in $\frac{1}{2}$ of it?

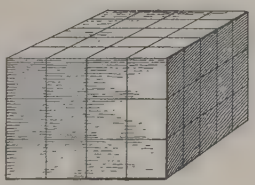


2. What part of the oblong is 1 row? How many square inches are there in $\frac{3}{4}$ of the oblong?

3. What part of the oblong is 1 column of squares? How many square inches are there in $\frac{1}{5}$ of the oblong? in $\frac{2}{5}$ of it? in $\frac{4}{5}$ of it? in $\frac{3}{5}$ of it?

4. Which has the greater area, $\frac{3}{4}$ of the oblong or $\frac{4}{5}$ of it? how many square inches greater?

5. This block, 5 in. long, 4 in. wide, and 3 in. high, is marked into cubic inches. How many are there in the bottom layer? in 2 layers? in the whole block?



How many cubic inches are there in $\frac{1}{3}$ of 60 cubic inches? in $\frac{2}{3}$ of 60 cubic inches?

6. How many cubic inches are shown along the side of the block? What part of the block do they form?

How many cubic inches is $\frac{1}{4}$ of 60 cubic inches? $\frac{2}{4}$, or $\frac{1}{2}$, of 60 cubic inches? $\frac{3}{4}$ of the block?

7. How many cubic inches are shown on the front end of the block? What part of the block do they form?

How many cubic inches is $\frac{1}{5}$ of 60 cubic inches? $\frac{2}{5}$?

How many cubic inches is $\frac{3}{5}$ of the block? $\frac{4}{5}$?

8. Which is greater, and how much, $\frac{1}{3}$ of the block or $\frac{1}{4}$ of it? $\frac{1}{5}$ of the block or $\frac{1}{4}$ of it?

ADDITION AND SUBTRACTION

EXERCISES

114. Add and test:

1.	2.	3.	4.	5.	6.
6	4	7	8	9	5
3	2	7	5	8	2
4	8	6	7	4	6
7	9	8	6	6	9
2	3	7	6	8	9
6	7	5	8	7	7
8	5	9	4	9	8

Find results rapidly:

7. $8+7+4+8+5+9$

8. $6+8+0+9+8+7$

9. $7+9-5+8-7+6$

10. $9-7+8+9-6-8$

11. $8+6+9+0+9+7$

12. $9+7-5-4+6-9$

13. $7+6+4+9+8+5$

14. $5+9+8-0-6-7$

EXERCISES

115. Give answers at sight:

1.	38	85	27	56	39	72	61	44
	+40	−20	+60	−26	−19	+22	−31	+11
2.	45	20	76	88	55	48	87	60
	−15	+57	−26	−33	+40	+30	−82	+17
3.	576	698	326	441	247	324		
	+20	−58	+400	−141	−30	+22		
4.	642	521	798	335	411	847		
	−32	+221	−58	−235	+66	−500		

EXERCISES

116. 1. Edwin has read 30 pages of his reader. How many pages more must he read to finish 50 pages?

2. Twenty boys and 15 girls were coasting on Scovel's hill. How many children were coasting?

3. A farmer has 56 cows in two stables. If there are 30 cows in one stable, how many are there in the other?

4. Roy earned 35¢ shoveling snow one week and 40¢ the next. How much did he earn in both weeks?

5. A milliner had 325 hats and sold 125 of them on her opening day. How many had she left?

6. A boy bought skates for 60¢ and a hockey stick for 20¢. How much change did he receive out of $1?

WRITTEN EXERCISES

117. Find the sum and the difference:

1. 4621 3849	**2.** 6040 2894	**3.** 1838 979	**4.** 5078 1999
5. 3141 1668	**6.** 8260 584	**7.** 4305 2572	**8.** 7241 2514

Add and test:

9. 2346 1824 3059 1487	**10.** 3288 964 4891 546	**11.** 2064 496 5283 1859	**12.** 1668 3847 2494 1865

13. 792 468 324 899 264	**14.** 563 98 746 392 854	**15.** 957 406 247 820 675	**16.** 846 281 978 89 561	**17.** 632 365 777 438 592

Find results:

18. $6209 + 2768 - 3689$

19. $8000 - 4825 + 794 - 247$

20. $2368 + 4542 - 2699 + 364 - 88$

21. $431 + 980 + 165 + 85 - 426 - 248$

22. $9423 - 526 + 94 - 1395 + 234 - 27$

23. $49 + 68 + 37 + 84 + 45 + 72 - 59 - 86$

24. $5841 - 278 - 92 + 2406 - 4209 - 466 - 59$

WRITTEN EXERCISES

118. 1. How many feet of fence are needed to inclose a lot 125 feet by 218 feet?

2. Mr. Hayes has 9248 bricks in two piles. If one pile contains 4135 bricks, how many are there in the other?

3. Maud washed 8 plates, 4 cups, 5 saucers, a dozen knives, 10 forks, and a dozen spoons. How many things did she wash?

4. If I buy groceries for 35¢ and meat for 28¢, how much change should I receive from 75¢?

5. Oliver counted the cars in six trains. There were 23, 37, 41, 38, 45, and 28. How many cars did he count?

6. If Ellen's father is now 37 years of age, in what year was he born?

7. From a piece of cloth containing 46 yards, 13 yards were sold at one time and 15 at another. How many yards remained unsold?

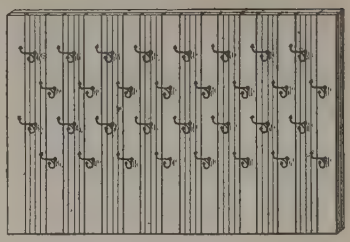
8. The postman delivered 185 letters on Monday, 246 on Tuesday, 219 on Wednesday, and 227 on Thursday. How many letters did he deliver in the four days?

9. Mr. Howard bought three loads of coal, the first weighing 3245 lb., the second 2984 lb., and the third 3163 lb. How many pounds of coal did he buy?

10. A man bought a sofa for $65, a chair for $18, and paid for them with a 100-dollar bill. How much change did he receive?

NUMBERS TO ONE HUNDRED

119. Counting by eights.



1. How many hooks are there in the top row?

2. How many hooks are there in 2 rows? in 3 rows?

3. How many boys can hang their hats on all the hooks?

4. How many hooks are 2 times 8 hooks? 3×8 hooks? 4×8 hooks?

5. How many hats are 4 times 8 hats and 8 hats more? How many hats are 5 times 8 hats?

6.

Five 8's = 40	$6 \times 8 =$ —	$7 \times 8 =$ —
One 8 = 8	+8	+8
Six 8's = —	$7 \times 8 =$ —	$8 \times 8 =$ —

7. How many are 8×8? Add 8 to 8×8 and find 9×8. Add another 8 and find 10×8.

8. Count by 8's from 0 to 10 times 8.

9. Memorize:

$1 \times 8 = 8$	$6 \times 8 = 48$
$2 \times 8 = 16$	$7 \times 8 = 56$
$3 \times 8 = 24$	$8 \times 8 = 64$
$4 \times 8 = 32$	$9 \times 8 = 72$
$5 \times 8 = 40$	$10 \times 8 = 80$

10. Copy, complete, and read:

$8 \div 8 =$	$48 \div 8 =$
$16 \div 8 =$	$56 \div 8 =$
$24 \div 8 =$	$64 \div 8 =$
$32 \div 8 =$	$72 \div 8 =$
$40 \div 8 =$	$80 \div 8 =$

120. Counting by nines.

1. How many men do you see in the nearest boat? in the second boat? in each boat?

2. How many men are there in 2 boats? in 3 boats? in all the boats?

3. How many men are 2 times 9 men? 3×9 men? 4×9 men? 4×9 men and 9 men more, or 5×9 men?

$$5 \times 9 = 45$$

4. Add 9 to 5×9, or to 45, and find 6×9, as shown here.

$$\begin{array}{r} \\ +9 \\ \hline 6 \times 9 = \end{array}$$

5. Add another 9 and find 7×9.

$$\begin{array}{r} \\ +9 \\ \hline 7 \times 9 = \end{array}$$

6. $7 \times 9 = 63$. Then how many are 8×9?

7. $8 \times 9 = ?$ $72 + 9 = ?$ $9 \times 9 = ?$ $10 \times 9 = ?$

8. How many square feet are there in 1 square yard? in 2 sq. yd.? in 3 sq. yd.? in 4 sq. yd.? in 5 sq. yd.? How many square feet are there in 6 sq. yd.? in 7 sq. yd.? in 8 sq. yd.? in 9 sq. yd.? in 10 sq. yd.?

9. Count by 9's from 0 to 10 times 9.

10. Memorize this **table of nines:**

$1 \times 9 = 9$	$6 \times 9 = 54$
$2 \times 9 = 18$	$7 \times 9 = 63$
$3 \times 9 = 27$	$8 \times 9 = 72$
$4 \times 9 = 36$	$9 \times 9 = 81$
$5 \times 9 = 45$	$10 \times 9 = 90$

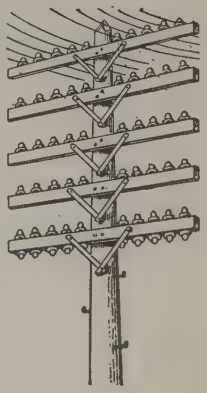
11. How many times is 9 contained in 9? in 18? in 27? in 36? in 45? in 54?

$63 \div 9 = ?$ $72 \div 9 = ?$

$81 \div 9 = ?$ $90 \div 9 = ?$

121. Counting by tens.

1. How many wires are supported by the highest cross-arm of this telephone pole?



2. How many wires will there be when two of the cross-arms, counting from the top, are full? when three are full? four?

3. How many wires will the pole support on the cross-arms now empty? How many will all the cross-arms support?

4. Count by 10's from 0 to ten 10's.

5. Memorize:

$1 \times 10 = 10$	$6 \times 10 = 60$
$2 \times 10 = 20$	$7 \times 10 = 70$
$3 \times 10 = 30$	$8 \times 10 = 80$
$4 \times 10 = 40$	$9 \times 10 = 90$
$5 \times 10 = 50$	$10 \times 10 = 100$

6. How many 10's are there in 10? in 20? in 30?

$40 \div 10 = ?$ $50 \div 10 = ?$

$60 \div 10 = ?$ $70 \div 10 = ?$

$80 \div 10 = ?$ $90 \div 10 = ?$

$100 = ? \times 10$; $100 \div 10 = ?$

REVIEW EXERCISES

122. Tell the missing numbers:

1. Multiples of 5.

$15 = 3 \times 5$	$25 =$
$20 =$	$50 =$
$35 =$	$10 =$
$5 =$	$45 =$
$40 =$	$30 =$

2. Multiples of 6.

$12 = 2 \times 6$	$24 =$
$36 =$	$6 =$
$18 =$	$30 =$
$42 =$	$54 =$
$60 =$	$48 =$

3. Count these stars by 3's; by 2's; by 6's; by 4's; by 8's.

How many stars do you count in each case?

$24 \div 3 = ?$ $24 \div 8 = ?$ $24 \div 6 = ?$ $24 \div 4 = ?$

Tell the number of 10's in the sum, then tell the sum:

4. $10 + 10 + 10$
5. $20 + 10$
6. $40 + 10 + 10$
7. $10 + 50 + 10$
8. $60 + 5 + 5 + 10$
9. $70 + 10 + 5 + 5$

Tell the number of 8's, or of 6's, etc., then the sum:

10.	11.	12.	13.	14.
8	6	7	9	9
8	6	14	18	27
8	18	7	9	9
16	6	7	9	9

Which is greater and how much greater:

15. 2×9 or 3×7?
16. 6×8 or 5×9?
17. 8×8 or 7×9?
18. $\frac{1}{2}$ of 18 or $\frac{1}{3}$ of 18?
19. $\frac{1}{3}$ of 24 or $\frac{1}{4}$ of 24?
20. $\frac{1}{5}$ of 40 or $\frac{1}{4}$ of 40?

123. The following exercises are for frequent review.

Give answers instantly:

1.	4×3	10×7	$20 \div 4$	6×4	10×10
2.	7×3	4×4	$12 \div 6$	3×3	$72 \div 9$
3.	2×9	10×8	$50 \div 10$	2×6	10×4
4.	5×3	5×5	$32 \div 4$	3×9	10×6
5.	2×7	10×9	$100 \div 10$	7×10	$49 \div 7$
6.	2×5	6×10	$48 \div 6$	9×6	$28 \div 4$
7.	4×9	2×8	$25 \div 5$	3×8	10×5
8.	5×8	3×10	$90 \div 9$	7×9	$48 \div 8$
9.	4×5	6×3	$54 \div 6$	6×5	$35 \div 7$
10.	6×8	4×10	$16 \div 4$	9×3	10×3
11.	9×7	8×8	$64 \div 8$	7×4	$\frac{1}{2}$ of 12
12.	5×6	9×9	$63 \div 7$	8×2	$\frac{1}{3}$ of 21
13.	8×4	4×6	$24 \div 4$	4×8	$\frac{1}{4}$ of 24
14.	5×9	7×8	$81 \div 9$	5×7	$\frac{1}{5}$ of 15
15.	7×2	9×4	$56 \div 7$	6×6	$\frac{1}{3}$ of 24
16.	8×3	8×7	$30 \div 3$	7×7	$\frac{1}{2}$ of 18
17.	2×10	6×9	$35 \div 5$	8×6	$\frac{1}{4}$ of 20
18.	6×2	3×6	$42 \div 6$	9×5	$\frac{1}{5}$ of 30
19.	3×7	9×2	$16 \div 2$	4×7	$\frac{1}{3}$ of 27
20.	5×4	6×7	$72 \div 8$	7×6	$\frac{1}{2}$ of 14
21.	8×5	3×5	$24 \div 3$	9×8	$\frac{1}{4}$ of 32
22.	9×10	8×9	$20 \div 10$	8×10	$\frac{1}{5}$ of 45

124. 1. Draw a 10-inch square and divide it into inch squares.

2. In the first *column* of squares write the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10, beginning at the top.

3. Now fill the first *row* with the multiples of 1 from 2×1 to 10×1, as shown below. Next fill the second row with the multiples of 2, then the third row with the multiples of 3, and so on until all the rows are full.

Here are the first two rows:

1's	1	2	3	4	5	6	7	8	9	10
2's	2	4	6	8	10	12	14	16	18	20

4. In your *table of multiples* find the number that represents 4×2; 5×3; 6×10; 8×4; 4×8; 3×6; 6×3; also 1×1; 2×2; 3×3; 4×4; and so on to 10×10.

5. Find and compare 6×8 and 8×6; 3×9 and 9×3.

6. In your table find 24 in four places. What does 24 stand for in each place?

125. 1. What numbers have 10 for their product? 12? 18?

$10 = 5 \times 2$, or 2×5.

$12 = 4 \times 3$, or 3×4, or 6×2, or 2×6.

$18 = 9 \times 2$, or ——, or 6×3, or ——.

Give numbers that have the following as products:

2. 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21.

3. 24, 25, 27, 28, 30, 32, 35, 36, 40, 42, 45, 48.

4. 50, 54, 56, 60, 63, 64, 70, 72, 80, 81, 90, 100.

Draw in as many ways as you can oblongs having the following areas:

5. 12 sq. in. 7. 18 sq. in. 9. 24 sq. in.
6. 16 sq. in. 8. 20 sq. in. 10. 28 sq. in.

126. Tell quotients and remainders:

1. $5\overline{)38}$	6. $8\overline{)68}$	11. $6\overline{)64}$	16. $4\overline{)39}$
2. $7\overline{)44}$	7. $9\overline{)85}$	12. $7\overline{)76}$	17. $8\overline{)77}$
3. $9\overline{)60}$	8. $7\overline{)58}$	13. $8\overline{)62}$	18. $9\overline{)89}$
4. $8\overline{)50}$	9. $6\overline{)47}$	14. $5\overline{)53}$	19. $10\overline{)65}$
5. $7\overline{)65}$	10. $8\overline{)84}$	15. $7\overline{)48}$	20. $10\overline{)97}$

Tell quotients and remainders:

21. $66 \div 7$	25. $92 \div 10$	29. $71 \div 8$	33. $96 \div 9$
22. $84 \div 9$	26. $68 \div 7$	30. $80 \div 9$	34. $69 \div 8$
23. $85 \div 8$	27. $75 \div 8$	31. $76 \div 7$	35. $59 \div 6$
24. $71 \div 7$	28. $88 \div 10$	32. $65 \div 6$	36. $104 \div 10$

127. 1. Horace bought a box of paints for 50¢ and 3 brushes at 9¢ each. How much money did he spend?

2. I have 50¢. How many 8-cent lamp chimneys can I buy, and how many cents shall I have left?

3. Harriet bought 6 glasses and a pitcher for 75¢. The glasses cost 9¢ each. How much did the pitcher cost?

4. Ida bought a tea kettle for 49¢ and 3 dippers at 10¢ each. Find the cost of the four articles.

5. Frank has a dollar. If he buys 4 tickets for a ball game at 10¢ each, how much money will he have left?

MULTIPLICATION

EXERCISES

128. Multiply at sight:

1.	5	7	9	10	20	30	50	500
	10	10	10	10	10	10	10	10

2. What figure written after 5 will change it from 5 units to 5 tens, or to 10 times 5?

3. What figure written after 7 will give 7 tens, or 10 times 7? What figure written after 12 will give 12 tens, or 10 times 12?

4. How can you multiply 15 by 10? 22 by 10? 18 by 10? any number by 10?

Multiply by 10:

5. 4	8. 16	11. 48	14. 750	17. 900
6. 9	9. 19	12. 52	15. 816	18. 965
7. 10	10. 24	13. 60	16. 884	19. 999

Find the number of:

20. Days in 10 wk.
21. Ounces in 10 lb.
22. Minutes in 10 hr.
23. Cents in 10 dollars.
24. Pints in 10 gal.
25. Square feet in 10 sq. yd.

26. If a trolley car travels 18 miles every trip it makes, and if it makes 10 trips per day, how many miles does it travel per day?

WRITTEN EXERCISES

129. Multiply:

1. 22 × 8	2. 34 × 9	3. 65 × 7	4. 99 × 4	5. 99 × 9
6. 250 × 7	7. 496 × 5	8. 372 × 7	9. 777 × 9	10. 707 × 6
11. 408 × 6	12. 382 × 8	13. 502 × 8	14. 545 × 8	15. 888 × 9
16. 608 × 9	17. 625 × 9	18. 907 × 5	19. 392 × 6	20. 999 × 8

Find the product of:

21. 75 and 8	24. 360 and 5	27. 9 and 435
22. 49 and 7	25. 940 and 7	28. 8 and 598
23. 68 and 9	26. 480 and 9	29. 9 and 989

30. Find the cost of 24 chairs at \$2 each.

\$24 × 2 = \$48

At \$1 each, 24 chairs would cost \$24.
At \$2 each, 24 chairs cost 2 times \$24, or \$48.

Find the cost of:

31. 25 hats at \$4 each.
32. 32 pears at 3¢ each.
33. 325 books at \$2 each.

Find the value of:

34. 96 ten-dollar bills.
35. 38 five-dollar bills.
36. 750 two-dollar bills.

37. If you can solve 3 exercises in a minute, how many can you solve in an hour at the same rate?

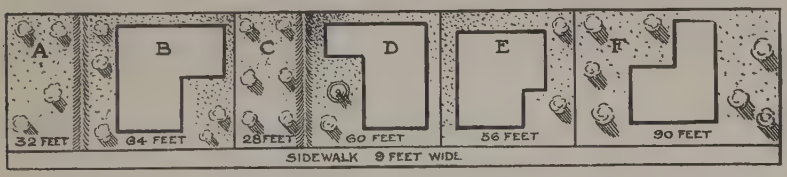
38. I bought a dozen cans of tomatoes at 9 cents a can. How much more than a dollar did I spend?

39. A woman bought 15 packages of flower seeds at 6 cents a package. How much did they cost?

40. The tailor has a pressing iron that weighs 14 pounds. How much did it cost, at 5 cents a pound?

WRITTEN EXERCISES

130. 1. The sidewalk in front of these lots is 9 feet wide. Mr. A's lot is 32 feet wide, Mr. B's 64 feet, and so on, as marked. Find the length and area of the sidewalk.



2. How many square feet of sidewalk must each man keep clear of snow in the winter time?

3. How many square yards of flagging did it take to make the sidewalk?

4. Mr. A's lot is worth \$8 a front foot, or 32 times \$8. Find the value of each of the six lots at the same rate.

5. Mr. E's lot is worth \$448, and his house is worth 7 times as much. How much is his house worth?

6. When the street was paved, Mr. A had to pay \$128, and Mr. B had to pay twice as much. How much was Mr. B obliged to pay?

7. How many cubic feet of water will a trough hold that is 16 ft. long, 2 ft. wide, and 2 ft. deep?

8. How many cubic feet of snow will a cart hold that is 9 ft. long, 4 ft. wide, and 3 ft. deep?

9. The leg of a table was 28 in. long, 3 in. wide, and 3 in. thick. How many cubic inches did it contain?

DIVISION

EXERCISES

131. Divide at sight:

1. 8)40 7)56 9)54 6)48 5)45 9)81 8)64

2. 6)60 8)72 8)56 9)63 4)36 10)80 10)100

3. 8)480 6)540 3)150 9)450 8)640 7)630 9)810

Tell quotients and remainders:

4.	5.	6.	7.	8.	9.
7)280	7)282	9)360	9)365	9)270	9)545
10.	**11.**	**12.**	**13.**	**14.**	**15.**
9)630	9)810	9)636	8)649	9)369	8)729
16.	**17.**	**18.**	**19.**	**20.**	**21.**
8)567	9)458	9)188	6)545	9)906	8)807

22. How many 10's are there in 30? in 50? in 100? in 120? in 150? in 240? in 480? in 500? in 6400?

Read all the numbers in this exercise as *tens*.

23. When a number ends in 0, how can you find how many times it contains 10?

24. Read as tens and units; then divide each number by 10, giving quotients and remainders:

34, 56, 106, 128, 265, 381, 576, 5760, 5762

25. Which figure, or figures, of a number tells how many times it contains 10? Which figure tells the remainder, if any? If there is no remainder what is the units' figure?

Divide by 10:

26. 75	**28.** 162	**30.** 287	**32.** 400	**34.** 9580
27. 98	**29.** 107	**31.** 356	**33.** 850	**35.** 4253

Divide:

36. $4)\overline{40+12}$	$4)\overline{52}$	$4)\overline{40+20}$	$4)\overline{60}$	$4)\overline{40+32}$	$4)\overline{72}$
37. $5)\overline{50+10}$	$5)\overline{60}$	$5)\overline{50+15}$	$5)\overline{65}$	$5)\overline{50+45}$	$5)\overline{95}$
38. $6)\overline{60+18}$	$6)\overline{78}$	$6)\overline{60+24}$	$6)\overline{84}$	$6)\overline{60+48}$	$6)\overline{108}$

WRITTEN EXERCISES

132. **1.** Divide 98 by 7.

$7)\overline{98}$
14

7 is contained in 9 tens, 1 ten times, with a remainder of 2 tens, or 20. Write 1 in tens' place, under the 9 tens.

7 is contained in $20+8$, or in 28, 4 times. Write 4 in units' place, under the 8 units. Read the quotient.

Test. — 7 times $14 = 98$.

2. Divide 45 by 3.

3. Divide 54 by 3.

4. Divide 64 by 4.

5. Divide 84 by 6.

Divide and test:

6.	7.	8.	9.	10.
$5\overline{)70}$	$6\overline{)96}$	$7\overline{)294}$	$8\overline{)96}$	$6\overline{)504}$
11.	**12.**	**13.**	**14.**	**15.**
$7\overline{)105}$	$5\overline{)125}$	$8\overline{)120}$	$9\overline{)108}$	$8\overline{)200}$
16.	**17.**	**18.**	**19.**	**20.**
$6\overline{)198}$	$6\overline{)216}$	$8\overline{)272}$	$7\overline{)385}$	$7\overline{)462}$

21. Divide 980 by 4.

$4\overline{)980}$
245

4 is contained in 9, 2 times with a remainder of 1; in 18, 4 times with a remainder of 2; in 20, 5 times. Read the quotient.

Divide and test:

22.	23.	24.	25.	26.
$3\overline{)747}$	$2\overline{)576}$	$4\overline{)932}$	$8\overline{)920}$	$6\overline{)864}$
27.	**28.**	**29.**	**30.**	**31.**
$5\overline{)1345}$	$2\overline{)1104}$	$7\overline{)2359}$	$6\overline{)1524}$	$5\overline{)1880}$

Find quotients:

32. $133 \div 7$	**37.** $1074 \div 3$	**42.** $1620 \div 9$
33. $282 \div 6$	**38.** $1350 \div 9$	**43.** $7839 \div 9$
34. $196 \div 7$	**39.** $1360 \div 8$	**44.** $7848 \div 8$
35. $594 \div 6$	**40.** $2097 \div 9$	**45.** $8010 \div 9$
36. $243 \div 9$	**41.** $3762 \div 6$	**46.** $5816 \div 8$

EXERCISES

133. 1. If 6 roses cost 30¢, how much will 4 roses cost?

MODEL SOLUTION

6 roses cost 30¢.
1 rose will cost 30¢ ÷ 6, or 5¢.
4 roses will cost 4 times 5¢, or 20¢.

2. If 2 pencils cost 8 cents, how much will 7 pencils cost?

3. Find the cost of 10 quarts of oil when 4 quarts cost 12 cents.

4. Find the cost of 5 quarts of molasses at 36 cents a gallon; at 28 cents a gallon.

5. The rate of postage on books is 1¢ for 2 ounces. How much will it cost to mail a book weighing one pound?

6. Find the cost of 9 pints of milk at 6 cents a quart.

7. If 5 telephone calls cost 25 cents, how much will 8 calls cost?

8. When 6 peaches cost 12 cents, how much must be paid for 10 peaches?

9. Albert bought 3 egg plants for 27 cents. At that price how much would 8 have cost?

10. A woman bought 10 pineapples for a dollar and sold 3 to a neighbor at cost. How much did she receive for the pineapples she sold?

11. If 5 railroad tickets cost a dollar, how much will 8 such tickets cost?

EXERCISES

134. 1. Point to $\frac{1}{3}$ of 12 marks. Now point to $\frac{2}{3}$ of 12 marks.

2. $\frac{2}{3}$ of 12 marks = —— times $\frac{1}{3}$ of 12 marks = ——.

3. Find $\frac{2}{5}$ of 20.

SOLUTION.—$\frac{1}{5}$ of 20 = 4; $\frac{2}{5}$ of 20 = 2 times 4 = 8.

Find the value of:

4. $\frac{2}{3}$ of 21	7. $\frac{2}{4}$ of 24	10. $\frac{2}{5}$ of 35	13. $\frac{3}{5}$ of 50
5. $\frac{3}{4}$ of 28	8. $\frac{3}{5}$ of 30	11. $\frac{4}{5}$ of 25	14. $\frac{3}{4}$ of 32
6. $\frac{2}{5}$ of 15	9. $\frac{2}{3}$ of 18	12. $\frac{2}{3}$ of 27	15. $\frac{4}{5}$ of 45

16. Find the cost of $\frac{2}{3}$ of a yard of oilcloth at 30 cents a yard.

17. Find the cost of $\frac{3}{4}$ of a pound of meat at 16 cents a pound.

135. 1. If 4 boys divide 1 pie equally, what part of the pie will each receive?

$\frac{1}{4}$ of 1 = —— fourth.

2. If 4 boys have 2 pies to divide equally instead of 1, how many fourths of a pie will each boy receive?

$\frac{1}{4}$ of 2 pies = $\frac{2}{4}$ of 1 pie.

$\frac{1}{4}$ of 2 = —— fourths of 1, or —— fourths.

3. How does $\frac{1}{4}$ of 3 pies compare with $\frac{1}{4}$ of 1 pie?

$\frac{1}{4}$ of 3 = —— fourths.

4. How does $\frac{1}{5}$ of 3 pies compare with $\frac{1}{5}$ of 1 pie?

$\frac{1}{5}$ of 3 = —— fifths.

5. If 4 hats cost \$3, what part of a dollar does 1 hat cost?

6. Five boys hire a boat for \$2. What part of a dollar should each pay?

7. If 3 girls divide 2 muskmelons equally, what part of a melon will each receive?

8. If 3 girls divide 4 melons equally, each girl will receive 1 melon and —— of a melon more.

$\frac{1}{3}$ of 4 melons = 1 melon + $\frac{1}{3}$ melon = $1\frac{1}{3}$ melons.

EXERCISES

1. $\frac{1}{4}$ of 5 apples = 1 apple + —— apple = —— apples.
2. $\frac{1}{5}$ of \$6 = \$1 + \$$\frac{1}{5}$ = \$$1\frac{1}{5}$; \$6 ÷ 5 = \$$1\frac{1}{5}$.
3. $\frac{1}{5}$ of \$7 = \$1 + \$—— = \$——; \$7 ÷ 5 = ——.
4. $\frac{1}{5}$ of \$8 = \$1 + \$—— = \$——; \$8 ÷ 5 = ——.
5. $\frac{1}{5}$ of \$12 = \$2 + \$—— = \$——; \$12 ÷ 5 = ——.

Find:

6. $\frac{1}{4}$ of \$7
7. $\frac{1}{4}$ of \$9
8. $\frac{1}{2}$ of \$11
9. $\frac{1}{3}$ of \$10
10. \$15 ÷ 2
11. \$11 ÷ 5
12. $\frac{1}{4}$ of \$33
13. $\frac{1}{3}$ of \$16
14. $\frac{1}{3}$ of 23 ft.
15. $\frac{1}{4}$ of 19 qt.
16. 13 hr. ÷ 3
17. 16 min. ÷ 5

Answer quickly:

18. $\frac{1}{3}$ of 14
19. $\frac{1}{5}$ of 28
20. $\frac{1}{4}$ of 33
21. $\frac{1}{3}$ of 19
22. $\frac{1}{4}$ of 25
23. $\frac{1}{5}$ of 49
24. $\frac{1}{3}$ of 28
25. $\frac{1}{2}$ of 19
26. 21 ÷ 2
27. 20 ÷ 3
28. 15 ÷ 4
29. 32 ÷ 5
30. 25 ÷ 6
31. 30 ÷ 7
32. 19 ÷ 8
33. 38 ÷ 9

WRITTEN EXERCISES

136. Divide:

1.	2.	3.	4.	5.
$2\overline{)575}$	$3\overline{)473}$	$4\overline{)839}$	$5\overline{)643}$	$8\overline{)1007}$
$287\frac{1}{2}$	$157\frac{2}{3}$	$209\frac{3}{4}$	$128\frac{3}{5}$	$125\frac{7}{8}$
6.	**7.**	**8.**	**9.**	**10.**
$2\overline{)347}$	$2\overline{)1451}$	$3\overline{)419}$	$4\overline{)751}$	$4\overline{)5263}$
11.	**12.**	**13.**	**14.**	**15.**
$5\overline{)867}$	$5\overline{)3744}$	$6\overline{)493}$	$6\overline{)8507}$	$7\overline{)936}$
16.	**17.**	**18.**	**19.**	**20.**
$6\overline{)9041}$	$8\overline{)755}$	$7\overline{)5833}$	$8\overline{)6663}$	$9\overline{)1000}$
21.	**22.**	**23.**	**24.**	**25.**
$8\overline{)2005}$	$10\overline{)4371}$	$9\overline{)5665}$	$10\overline{)8433}$	$9\overline{)6847}$

EXERCISES

137. 1. How many valentines can be bought for 15 cents at 2 valentines for 5 cents?

MODEL SOLUTION

2 valentines cost 5¢.
15¢ = 3 times 5¢.
15¢ will buy 3 times 2 valentines, or 6 valentines.

2. When 4 jelly glasses cost 10¢, how many can be bought for 20¢? How much will a dozen cost?

3. Mabel expended 25 cents for peaches at 6 for 5 cents. How many peaches did she buy?

4. If a boy can read 2 pages of a book in 3 minutes, how many pages can he read in half an hour?

5. At the store Eva saw piles of oranges marked thus:

3 for 10¢	2 for 5¢	3 for 5¢	4 for 5¢

She had 40 cents. How many oranges of the first kind could she buy? of each of the other kinds?

6. Find the cost of a dozen oranges of each kind.

REVIEW

EXERCISES

138. 1. Count by 6's from 1 to 49 and back again; from 3 to 57 and back; from 5 to 65 and back.

2. Count by 7's from 2 to 58 and back again; from 4 to 67 and back; from 6 to 76 and back.

3. Count by 8's from 3 to 59 and back again; from 5 to 77 and back; from 7 to 87 and back.

4. Count by 9's from 4 to 76 and back again; from 6 to 87 and back; from 8 to 98 and back.

Find results rapidly:

5. $3+4-2+5+7-3+4+2-7-6+9+0-5$

6. $9+8-0+4-6+2-8+5+6-5+3+9-6-4$

7. $150-60$ $\quad 410\times 8$ $\quad 4)280$ $\quad 6)300$ $\quad 999+1$ $\quad 2000-100$

8. Read: 101, 110, 1010, 4005, 9099, 8056.

9. How many pans costing 6 cents each can be bought for 50 cents, and how many cents will be left?

10. A street car conductor exchanged a dollar bill for 5-cent coins. How many 5-cent coins did he receive?

11. If a boat sails 10 miles an hour, how long will it take to sail 120 miles?

How far will it sail in 24 hours?

12. How many yards are there in 96 feet?

13. A man had $650 in the bank and drew out $240. How much money had he left in the bank?

14. How many hours is it from 9 A.M. to 4 P.M.?

15. A pudding put into the oven at 10:30 A.M. is to bake 40 minutes. At what time will it be done?

WRITTEN EXERCISES

139. 1. Write in words: 1001, 2005, 4056, $\frac{5}{6}$.

2. Add: seven hundred twenty, sixty-nine, four thousand eight hundred seven, ninety-six.

3. Divide two thousand forty-five by five.

4. Find 6 times 857, then 4 times 857. Add the products. The answer should be —— times 857.

5. How much less than $1000 is $825?

Multiply:	Multiply:	Divide:
6. 485 by 3	9. 307 by 9	12. 1208 by 4
7. 766 by 8	10. 448 by 7	13. 3699 by 9
8. 959 by 9	11. 519 by 10	14. 7280 by 8

Add:

15. $2564 + 833 + 275 + 688$

16. $4826 + 725 + 487 + 853$

17. $408 + 1269 + 672 + 6220$

18. $198 + 1827 + 222 + 4489$

Subtract:

19. $400 - 85$

20. $900 - 56$

21. $2050 - 765$

22. $9000 - 5280$

Find the value of:

23. $\frac{1}{4}$ of 1600

24. $\frac{1}{2}$ of 1860

25. $\frac{1}{5}$ of 375

26. $\frac{1}{4}$ of 3400

27. $\frac{1}{5}$ of 2440

28. $\frac{1}{3}$ of 5280

29. If a boy goes 2 feet at every step, how far will he go in 20 steps? in 100 steps?

30. How long will it take an automobile to run 168 miles at the rate of 8 miles an hour?

31. Edward stood halfway between two street lights that were 330 feet apart. How far was he from each?

32. A baker made 96 pies. If $\frac{1}{4}$ of them were lemon pies, how many lemon pies did he make?

33. If a cow gives 8 quarts of milk twice a day, how much milk does she give in a week?

34. If 1 lb. of cheese can be made from 10 lb. of milk, how much cheese can be made from 1280 lb. of milk?

35. How many ounces are there in 8 pounds?

36. Find the volume of a brick 8 inches long, 4 inches wide, and 2 inches thick.

37. If it costs 25 cents to telephone 5 minutes from New York to Brooklyn, how much will it cost a man who speaks 15 minutes?

EXERCISES

140. Make and solve as many problems as you can about the following:

1. Paul has 60 marbles, George 10 marbles.

2. Marbles cost 1¢ for 6, 1¢ for 3, 2¢ for 5, 3¢ for 5, 1¢ each, 2¢ each. Use prices in your city.

3. A wild rose has 5 petals.

4. A spider has 8 legs; a bee, 6 legs; a horse, 4 legs.

5. A cat has 5 toes on each fore paw and 4 toes on each hind paw.

The following are prices at a fruit stand:

6. Dates, 8¢ a pound.

7. Figs, 20¢ a pound.

8. Bananas, 2 for 3¢.

9. Oranges, 2 for 5¢, 3 for 10¢.

10. Nuts, 16¢ a pound.

11. Lemons, 2¢ each.

12. Grapes, 15¢ a pound.

Here are some prices at a stationer's store:

13. Pencils, 1¢, 2¢, 3¢, 5¢ each; 10¢ a doz., 25¢ a doz.

14. Pens, 6 for 5¢.

15. Books, from 25¢ to $1 each.

16. Blotters, 8 for 5¢.

17. Ink, 5¢ a bottle, small size; 25¢ a bottle, large size.

UNITED STATES MONEY

141. 1. Write, using the sign $: eight dollars; eleven dollars; twenty-five dollars; one hundred five dollars; six hundred forty-eight dollars.

2. One dollar thirty-eight cents is written in this way: $1.38.

The period that is used to separate the dollars from the cents is called the **decimal point.**

Read:

$3.25	$7.42	$18.69	$145.75	$168.94
$9.81	$5.36	$48.20	$201.47	$500.60

Write: two dollars forty-five cents; twelve dollars forty cents; ten dollars eleven cents; one hundred twenty dollars seventy-two cents; five hundred thirty dollars sixty-one cents.

3. Eighty-five cents is written in this way: $.85.

When there are no dollars the sign $ is written, then the decimal point, and after that the number of cents.

Sometimes 0 is written just before the decimal point in this way: $0.85.

Read:

$.75	$0.24	$.50	$0.72	$.44	$.13
$.86	$0.99	$.25	$0.94	$.60	$.49

Write the following in two ways, using the sign $:

Ten cents.	Sixty-four cents.	Thirty-six cents.
Forty cents.	Thirty-two cents.	Ninety-five cents.
Eleven cents.	Eighty-one cents.	Seventy-nine cents.

4. Three dollars nine cents is written in this way: $3.09.

When the number of cents is less than 10, the figure 0 is written in the first place after the decimal point.

Read: $1.05; $.03; $.09; $0.08; $8.06; $25.04; $840.07; $264.00; $326.01.

Write: two dollars five cents; eight cents; five hundred dollars six cents; eight hundred twenty-five dollars; sixty-three dollars seven cents.

EXERCISES

142. 1. Read the following:

$8.08	$.70	$80.60	$139.79
$0.62	$.15	$49.25	$375.00
$3.02	$.06	$93.38	$608.04

2. Write in columns so that decimal points shall stand in a column:

Thirteen cents.
Twenty-four dollars.
Eight dollars four cents.
Fifty dollars one cent.
Sixty dollars ten cents.
Fifty-six dollars two cents.
Thirty-eight dollars sixty-nine cents.
Seventy-seven dollars twenty-three cents.
One hundred seventy-five dollars fifty cents.
Four hundred twelve dollars five cents.
Seven hundred eighty dollars eighteen cents.
Nine hundred ninety-nine dollars ninety-nine cents.

ADDITION AND SUBTRACTION

EXERCISES

143. Add quickly:

1.	\$25	\$37	\$42	\$23	\$64	\$56
	34	22	35	56	13	42

Subtract:

2.	68¢	75¢	89¢	76¢	88¢	94¢
	24¢	42¢	53¢	34¢	35¢	41¢

Give answers at sight:

3.	35¢	\$.35	69¢	\$.69	\$.33	\$.84
	+ 13¢	+ .13	− 25¢	− .25	+ .54	− .31
4.	100¢	\$1.00	156¢	\$1.56	\$2.34	\$3.86
	+ 40¢	+ .40	− 33¢	− .33	+ .25	− .62
5.	\$3.20	\$4.68	\$5.37	\$5.96	\$3.75	\$6.23
	+ .65	− .32	+ .22	− .43	− .52	+ .66

WRITTEN EXERCISES

144. 1. Find the sum of \$39.82, \$7.31, \$.49, and \$18.08.

\$39.82	Arrange the numbers so that the deci-
7.31	mal points shall stand in the same column.
.49	Add as you have added other numbers.
18.08	Put the decimal point in the sum under
\$65.70	the other decimal points. Read the sum.

Copy, add, and test:

2. \$22.68	3. \$16.83	4. \$46.32	5. \$28.75
15.96	45.67	19.87	6.42
32.11	9.84	20.78	.53
19.84	20.45	14.85	32.19
6. \$16.46	7. \$27.34	8. \$35.44	9. \$17.45
2.39	.05	10.10	12.99
8.47	41.20	.16	58.80
9.26	13.98	46.89	18.34

Subtract, putting the decimal point in the remainder under the other decimal points:

10. \$4.09	11. \$18.72	12. \$83.04	13. \$60.35
2.75	9.38	24.96	39.76
14. \$9.13	15. \$54.00	16. \$67.18	17. \$94.62
5.64	.75	39.28	8.94
18. \$7.36	19. \$80.00	20. \$91.07	21. \$58.27
.98	14.37	45.45	.85
22. \$6.24	23. \$74.84	24. \$85.05	25. \$77.77
4.85	6.95	56.31	8.88
26. \$9.00	27. \$40.41	28. \$90.06	29. \$96.03
8.46	9.66	38.39	76.05

30. How much more is \$87.24 than \$28.56?

31. Find the difference between \$36.03 and \$9.45.

These examples have been added and tested in less than 8 minutes. Practice until you can do as well or better.

32. \$8.65	**33.** \$45.68	**34.** \$21.57	**35.** \$17.84
9.99	8.74	17.98	.55
4.87	14.08	12.49	26.79
2.12	.97	16.35	31.99
7.75	26.79	29.78	3.08
36. \$5.73	**37.** \$10.98	**38.** \$31.44	**39.** \$19.69
8.99	7.49	28.39	27.97
4.27	26.78	14.16	18.48
9.68	43.42	10.10	16.76
6.77	9.99	15.28	9.85
40. \$7.06	**41.** \$25.47	**42.** \$15.86	**43.** \$38.47
3.92	8.68	6.73	19.71
8.45	29.22	12.97	5.63
6.39	14.62	.89	6.42
9.86	3.93	32.76	16.98
5.98	18.08	11.69	12.79
44. \$4.96	**45.** \$38.06	**46.** \$23.65	**47.** \$37.50
2.63	7.36	.89	10.99
8.47	13.91	8.43	4.65
9.24	22.88	6.78	23.76
7.65	4.76	42.39	5.84
6.38	13.03	5.20	17.26

48. What is the sum of \$27.94, \$6.81, \$45.30, and \$18.00?

49. Find the sum of \$9.34, \$.69, \$34.15, \$8.75, and \$47.07.

WRITTEN EXERCISES

145. The following table shows how much money the children in the third grade of a certain school deposited in their school savings bank from January to June, and how much they drew from the bank each month.

	A CLASS		B CLASS	
	DEPOSITED	WITHDRAWN	DEPOSITED	WITHDRAWN
JAN.	$1.36	$0.18	$1.41	$0.37
FEB.	1.35	.42	1.19	.15
MAR. . . .	1.56	.28	1.48	.39
APR.	2.25	.50	1.62	.25
MAY	1.75	1.19	1.96	.37
JUNE	1.73	1.05	2.10	1.15

1. During January how much more did the A class deposit than they withdrew, or how much did they *save?*

2. Did the B class save more or less than the A class during January, and how much more or less?

3. How much more did the A class deposit during February than the B class?

4. Which class saved the greater amount of money during February, and how much greater?

5. Compare the savings of the two classes during March; during April; during May; during June.

6. At the end of January, how much money was there in the bank belonging to each class? to both classes?

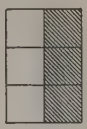
7. Which class had the greater amount of money in the bank at the end of June, and how much greater?

FRACTIONS

146. 1. Into how many equal parts is this oblong divided? What is each part called?

How many fourths are shaded? how many halves?
How many fourths are there in $\frac{1}{2}$ of the oblong?
To how many fourths is $\frac{1}{2}$ equal?

2. Into how many equal parts is this oblong divided? What is each part called?



How many sixths are shaded? how many halves?
How many sixths are there in $\frac{1}{2}$ of the oblong?
To how many sixths is $\frac{1}{2}$ equal?

3. How many sixths of this oblong are shaded? how many thirds?

How many sixths are there in $\frac{1}{3}$ of the oblong?
To how many sixths is $\frac{1}{3}$ equal?

4. How many sixths of the oblong are light? how many thirds?
How many sixths are there in $\frac{2}{3}$ of the oblong?
To how many sixths is $\frac{2}{3}$ equal?

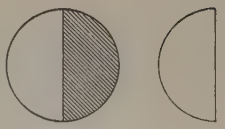
5. One or more of the *equal* parts of anything is called a **fraction**. Name some fractions.

EXERCISES

Draw lines or oblongs and divide them to show that:

1. $\frac{1}{2} = \frac{2}{4}$
2. $\frac{3}{6} = \frac{1}{2}$
3. $\frac{1}{3} = \frac{2}{6}$
4. $\frac{4}{6} = \frac{2}{3}$
5. $\frac{1}{2} = \frac{3}{6}$
6. $\frac{2}{4} = \frac{1}{2}$
7. $\frac{2}{6} = \frac{1}{3}$
8. $\frac{2}{3} = \frac{4}{6}$

147. Adding and subtracting halves.



1. How many halves are 1 half and 1 half? how many ones? How many halves are 2 halves + 1 half? how many ones and how many halves over?

$\frac{1}{2}+\frac{1}{2}=?$ $\frac{2}{2}+\frac{1}{2}=?$ $1+\frac{1}{2}=?$ $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}=?$

2. How many halves are there in 1? How many halves are 2 halves less 1 half? $\frac{2}{2}-\frac{1}{2}$? $1-\frac{1}{2}$?

How many halves are $\frac{3}{2}-\frac{1}{2}$? how many ones?

How many are $1\frac{1}{2}-\frac{1}{2}$? $2-\frac{1}{2}$? $2\frac{1}{2}-\frac{1}{2}$?

EXERCISES

148. Give answers:

1. $\$\frac{1}{2}+\$\frac{1}{2}$
2. 2 ft. $-\frac{1}{2}$ ft.
3. $1\frac{1}{2}$ oz. $+\frac{1}{2}$ oz.
4. $\frac{1}{2}$ lb. $+2\frac{1}{2}$ lb.
5. $\frac{1}{2}$ qt. $+\frac{1}{2}$ qt. $+\frac{1}{2}$ qt.
6. 3 pt. $-\frac{1}{2}$ pt. $-\frac{1}{2}$ pt.

7. $3\frac{1}{2}$ $+2$
8. $1\frac{1}{2}$ $+2\frac{1}{2}$
9. 5 $-\frac{1}{2}$
10. $4\frac{1}{2}$ $-1\frac{1}{2}$
11. $7\frac{1}{2}$ $+\frac{1}{2}$

12. $6\frac{1}{2}$ $-2\frac{1}{2}$
13. $4\frac{1}{2}$ $+3\frac{1}{2}$
14. $8\frac{1}{2}$ -5
15. 3 $+2\frac{1}{2}$
16. $9\frac{1}{2}$ $-6\frac{1}{2}$

17. Find the sum of $2\frac{1}{2}$ gal., $\frac{1}{2}$ gal., and $5\frac{1}{2}$ gal.

18. Edna bought 6 yards of ribbon and used $3\frac{1}{2}$ yards of it for her dress. How many yards did she have left?

19. If it takes $2\frac{1}{2}$ yards of cloth for a jacket and $6\frac{1}{2}$ yards for a skirt, how many yards are needed for both?

WRITTEN EXERCISES

149. Find the sum and the difference:

1. $48\frac{1}{2}$	2. 39	3. $28\frac{1}{2}$	4. $62\frac{1}{2}$	5. 30
$22\frac{1}{2}$	$24\frac{1}{2}$	$9\frac{1}{2}$	37	$14\frac{1}{2}$
6. $72\frac{1}{2}$	7. $61\frac{1}{2}$	8. 51	9. $44\frac{1}{2}$	10. 82
$31\frac{1}{2}$	$42\frac{1}{2}$	$25\frac{1}{2}$	$36\frac{1}{2}$	$17\frac{1}{2}$

Find answers:

11. $64-20\frac{1}{2}$ 13. $20-14\frac{1}{2}$ 15. $46\frac{1}{2}+28-36\frac{1}{2}$

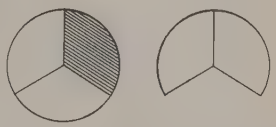
12. $43\frac{1}{2}-25\frac{1}{2}$ 14. $67-46\frac{1}{2}$ 16. $31\frac{1}{2}+24\frac{1}{2}+9\frac{1}{2}$

17. What is the perimeter of a room that is $20\frac{1}{2}$ feet long and 17 feet wide?

18. From a piece of dress goods $40\frac{1}{2}$ yards long a merchant sold $14\frac{1}{2}$ yards. How many yards were left?

150. Adding and subtracting thirds.

1. How many thirds are $\frac{1}{3}$, $\frac{1}{3}$, and $\frac{1}{3}$? how many ones? How many thirds are $\frac{3}{3}$ and $\frac{2}{3}$? how many ones and how many thirds over?



$\frac{1}{3}+\frac{1}{3}+\frac{1}{3}=?$ $\frac{3}{3}+\frac{2}{3}=?$ $1+\frac{2}{3}=?$ $\frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}=?$

2. How many thirds are there in 1? How many thirds are $\frac{3}{3}-\frac{1}{3}$? $1-\frac{1}{3}$? $\frac{3}{3}-\frac{2}{3}$? $1-\frac{2}{3}$?

How many thirds are $\frac{5}{3}-\frac{2}{3}$? how many ones?

How many are $1\frac{2}{3}-\frac{2}{3}$? $1\frac{2}{3}-\frac{1}{3}$? $1\frac{2}{3}-1$?

EXERCISES

151. Add and subtract:

1.	2.	3.	4.	5.
$1\frac{1}{3}$	3	$2\frac{2}{3}$	$6\frac{2}{3}$	$4\frac{1}{3}$
$\frac{1}{3}$	$2\frac{2}{3}$	$1\frac{1}{3}$	$4\frac{2}{3}$	2

Add:

6.	7.	8.	9.	10.
3	$2\frac{1}{3}$	$4\frac{1}{3}$	$5\frac{2}{3}$	$3\frac{2}{3}$
$1\frac{2}{3}$	$1\frac{1}{3}$	3	$\frac{1}{3}$	$2\frac{2}{3}$
4	$3\frac{1}{3}$	$2\frac{2}{3}$	$3\frac{1}{3}$	$1\frac{1}{3}$

11. From $7\frac{2}{3}$ dozen subtract $3\frac{1}{3}$ dozen.

12. How many years are $3\frac{1}{3}$ yr., $2\frac{2}{3}$ yr., and $1\frac{1}{3}$ yr.?

WRITTEN EXERCISES

152. Add and subtract:

1.	2.	3.	4.	5.
$27\frac{2}{3}$	$46\frac{2}{3}$	78	$51\frac{1}{3}$	$47\frac{2}{3}$
14	$31\frac{1}{3}$	$19\frac{1}{3}$	$26\frac{1}{3}$	$39\frac{2}{3}$

Add:

6.	7.	8.	9.	10.
25	$37\frac{1}{3}$	$35\frac{2}{3}$	$42\frac{2}{3}$	$25\frac{2}{3}$
$38\frac{2}{3}$	$23\frac{1}{3}$	$18\frac{1}{3}$	$15\frac{1}{3}$	$22\frac{2}{3}$
$19\frac{1}{3}$	13	$40\frac{1}{3}$	$18\frac{2}{3}$	$41\frac{2}{3}$

Find the value of:

11. $23 + 18\frac{2}{3} + 35\frac{1}{3}$

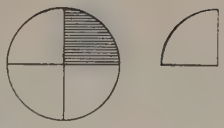
12. $79 - 24\frac{1}{3} + 16\frac{2}{3}$

13. $97 - 38\frac{1}{3} - 43\frac{1}{3} + 12\frac{1}{3}$

14. $36\frac{2}{3} + 14\frac{1}{3} - 27\frac{1}{3} - 18$

153. Adding and subtracting fourths.

1. How many fourths are $\frac{1}{4}$, $\frac{1}{4}$, $\frac{1}{4}$, and $\frac{1}{4}$? how many ones?



How many fourths are $\frac{4}{4}$ and $\frac{1}{4}$? how many ones and how many fourths over?

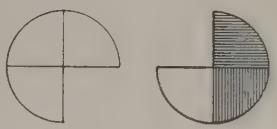
$\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=?$ $\quad \frac{4}{4}+\frac{1}{4}=?$ $\quad 1+\frac{1}{4}=?$ $\quad \frac{3}{4}+\frac{1}{4}=?$

2. How many fourths are there in 1? How many fourths are $\frac{4}{4}-\frac{1}{4}$? $\quad 1-\frac{1}{4}$? $\quad \frac{4}{4}-\frac{3}{4}$? $\quad 1-\frac{3}{4}$?

How many fourths are $\frac{5}{4}-\frac{1}{4}$? how many ones?

$1\frac{1}{4}-\frac{1}{4}=?$ $\quad 2\frac{1}{4}-\frac{1}{4}=?$ $\quad 1\frac{1}{4}-1=?$ $\quad 2\frac{1}{4}-2=?$

3. How many fourths are $\frac{3}{4}$ and $\frac{3}{4}$? how many ones and how many fourths over?



How many halves are $\frac{2}{4}$?

Then $\frac{3}{4}$ and $\frac{3}{4}$ are how many ones and how many *halves* over?

In answers, for $\frac{2}{4}$ we should always write $\frac{1}{2}$.

EXERCISES

154. Find the value of:

1. $\frac{1}{4}+\frac{3}{4}$
2. $\frac{1}{4}+\frac{1}{4}$
3. $\frac{3}{4}-\frac{1}{4}$
4. $1\frac{3}{4}-\frac{3}{4}$
5. $\$\frac{3}{4}+\$\frac{1}{4}+\$\frac{1}{4}+\$\frac{1}{4}$
6. $\$1-\$\frac{1}{4}-\$\frac{1}{4}-\$\frac{1}{4}$

Add and subtract:

7. $5\frac{1}{4}$ / $2\frac{1}{4}$
8. $6\frac{3}{4}$ / $2\frac{1}{4}$
9. 8 / $5\frac{1}{4}$
10. $4\frac{3}{4}$ / $3\frac{3}{4}$
11. 6 / $3\frac{3}{4}$

12. What is the sum of $\$3\frac{1}{4}$, $\$4\frac{3}{4}$, and $\$1\frac{1}{4}$?

13. How much more is $3\frac{3}{4}$ pounds than $1\frac{1}{4}$ pounds?

14. Mrs. James bought 5 gallons of kerosene and at the end of a week there were $2\frac{1}{2}$ gallons left. How many gallons had she used?

WRITTEN EXERCISES

155. Add and subtract:

1.	2.	3.	4.	5.
$24\frac{1}{4}$	$63\frac{1}{4}$	$59\frac{3}{4}$	35	61
16	$25\frac{1}{4}$	$32\frac{3}{4}$	$19\frac{1}{4}$	$33\frac{3}{4}$

Add:

6.	7.	8.	9.	10.
$13\frac{1}{4}$	$52\frac{3}{4}$	$25\frac{1}{4}$	$12\frac{3}{4}$	$23\frac{3}{4}$
$24\frac{1}{4}$	9	$38\frac{3}{4}$	$44\frac{1}{4}$	$32\frac{3}{4}$
$16\frac{1}{4}$	$20\frac{1}{4}$	$17\frac{1}{4}$	$36\frac{3}{4}$	$41\frac{3}{4}$

156. Adding and subtracting sixths.

1. How many sixths are there in 1? How many sixths are $\frac{6}{6}+\frac{1}{6}$? how many ones and how many sixths over?

How many are $1+\frac{1}{6}$? $2+\frac{1}{6}$? $2\frac{1}{6}+2$?

2. Find $\frac{6}{6}-\frac{1}{6}$; $1-\frac{1}{6}$; $\frac{6}{6}-\frac{5}{6}$; $1-\frac{5}{6}$.
How many are $1\frac{1}{6}-\frac{1}{6}$? $2\frac{1}{6}-\frac{1}{6}$? $1\frac{1}{6}-1$? $2\frac{1}{6}-2$?

3. How many sixths are $\frac{1}{6}+\frac{1}{6}$? how many *thirds?*
How many sixths are $\frac{1}{6}+\frac{1}{6}+\frac{1}{6}$? how many *halves?*
How many sixths are $\frac{5}{6}-\frac{1}{6}$? how many *thirds?*
In answers we should write $\frac{1}{3}$ instead of $\frac{2}{6}$, $\frac{1}{2}$ instead of $\frac{3}{6}$, and $\frac{2}{3}$ instead of $\frac{4}{6}$.

WRITTEN EXERCISES

157. Add and subtract:

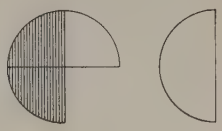
1.	2.	3.	4.	5.
45	78	$57\frac{1}{6}$	$36\frac{5}{6}$	$43\frac{5}{6}$
$12\frac{1}{6}$	$14\frac{5}{6}$	$23\frac{1}{6}$	$21\frac{1}{6}$	$32\frac{5}{6}$

Add:

6.	7.	8.	9.	10.
$13\frac{1}{6}$	$25\frac{5}{6}$	$38\frac{1}{6}$	$30\frac{5}{6}$	16
14	$32\frac{1}{6}$	$9\frac{1}{6}$	$12\frac{1}{6}$	$7\frac{5}{6}$
$13\frac{1}{6}$	$6\frac{1}{6}$	$14\frac{1}{6}$	$28\frac{5}{6}$	$50\frac{5}{6}$

158. Adding and subtracting halves and fourths.

1. We wish to add $\frac{3}{4}$ and $\frac{1}{2}$. Can we do so without changing either fraction?



To how many fourths is $\frac{1}{2}$ equal? How many fourths, then, are $\frac{3}{4}$ and $\frac{2}{4}$? how many ones and how many fourths over?

Then what is the sum of $\frac{3}{4}$ and $\frac{1}{2}$?

2. Can you find $\frac{3}{4} - \frac{1}{2}$ without changing either fraction? Which fraction should be changed? To what *equal* fraction should it be changed?

Then what is the value of $\frac{3}{4} - \frac{2}{4}$, or of $\frac{3}{4} - \frac{1}{2}$?

159. Find the value of:

1. $\frac{1}{2} - \frac{1}{4}$	3. $\frac{3}{4} + 2\frac{1}{2}$	5. $\frac{1}{4} + \frac{1}{2} + \frac{1}{4}$
2. $\frac{1}{2} + \frac{1}{4}$	4. $1\frac{3}{4} - \frac{1}{2}$	6. $\frac{1}{2} + \frac{3}{4} - \frac{1}{4}$

Add and subtract:

7.	8.	9.	10.	11.
$2\frac{1}{2}$	7	$5\frac{3}{4}$	$6\frac{1}{2}$	$8\frac{3}{4}$
$1\frac{1}{4}$	$4\frac{3}{4}$	$3\frac{1}{2}$	2	$4\frac{1}{4}$

12. Find the perimeter of an oblong rug $3\frac{1}{2}$ feet long and $2\frac{1}{4}$ feet wide.

13. Edna had $1\frac{3}{4}$ qt. of lemonade. When $\frac{1}{2}$ qt. of it was used, how much was left?

14. Ralph has earned $\$2\frac{3}{4}$, and his brother $\$1\frac{1}{2}$. How much have both boys earned?

15. From a pound of sugar, $\frac{1}{4}$ lb. was used for coffee and $\frac{1}{2}$ lb. for a pudding. What part of a pound was left?

WRITTEN EXERCISES

160. Find the missing numbers:

1.	2.	3.	4.	5.
$25\frac{1}{2}$	$42\frac{1}{4}$	$58\frac{3}{4}$	$58\frac{3}{4}$	$61\frac{3}{4}$
$-$ ____	$-$ ____	$-$ ____	$-$ ____	$-$ ____
$12\frac{1}{4}$	$26\frac{1}{4}$	$37\frac{1}{4}$	$22\frac{1}{2}$	$48\frac{3}{4}$

Add:

6.	7.	8.	9.	10.
$41\frac{1}{2}$	$23\frac{1}{4}$	$32\frac{1}{4}$	$59\frac{1}{2}$	$17\frac{1}{2}$
$28\frac{1}{4}$	$15\frac{1}{4}$	$24\frac{1}{4}$	$8\frac{3}{4}$	$36\frac{3}{4}$
$16\frac{1}{2}$	$45\frac{1}{2}$	$35\frac{3}{4}$	$27\frac{3}{4}$	$44\frac{1}{2}$

Find answers:

11. $14\frac{1}{2} + 18\frac{1}{4} + 26\frac{3}{4}$

12. $85\frac{3}{4} - 28\frac{1}{2} + 13\frac{3}{4}$

13. $44\frac{1}{4} + 39\frac{1}{2} - 8\frac{1}{4} - 21\frac{1}{4}$

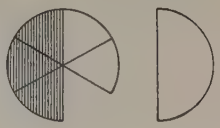
14. $76 - 14\frac{1}{4} - 30\frac{1}{2} + 19\frac{3}{4}$

161. Halves and sixths, thirds and sixths.

1. Which of the fractions $\frac{5}{6}$ or $\frac{1}{2}$ must be changed before we can add them?

To how many sixths is $\frac{1}{2}$ equal?

How many sixths are $\frac{5}{6} + \frac{3}{6}$? how many ones and how many sixths over? how many thirds over?



Then what is the sum of $\frac{5}{6}$ and $\frac{1}{2}$?

2. How many sixths are $\frac{5}{6} - \frac{3}{6}$? how many thirds?

Then what is the difference between $\frac{5}{6}$ and $\frac{1}{2}$?

3. How many sixths are there in $\frac{1}{3}$? in $\frac{1}{3} + \frac{1}{6}$?

How many halves are $\frac{1}{3} + \frac{1}{6}$?

4. How many sixths are there in $\frac{1}{3} - \frac{1}{6}$?

EXERCISES

162. Find the value of:

1. $\frac{1}{6} + \frac{1}{2}$
2. $\frac{5}{6} + \frac{2}{3}$
3. $\frac{5}{6} - \frac{1}{3}$
4. $\frac{2}{3} - \frac{1}{6}$
5. $3 + 1\frac{1}{3} - 2\frac{1}{6}$
6. $4\frac{5}{6} - 2\frac{1}{2} + 5$

Add:

7. $3\frac{1}{2}$ + $4\frac{5}{6}$
8. $6\frac{1}{3}$ + $2\frac{1}{6}$
9. $4\frac{1}{6}$ + $5\frac{2}{3}$
10. $5\frac{1}{2}$ + $1\frac{1}{6}$
11. $3\frac{2}{3}$ + $2\frac{5}{6}$

Find the missing numbers:

12. $8\frac{1}{2}$ − = $3\frac{1}{6}$
13. $4\frac{1}{6}$ + = $7\frac{1}{3}$
14. $2\frac{1}{3}$ + = $6\frac{5}{6}$
15. $9\frac{5}{6}$ − = $2\frac{1}{2}$
16. $7\frac{5}{6}$ − = $4\frac{2}{3}$

17. Mabel picked $4\frac{1}{3}$ dozen violets and $1\frac{5}{6}$ dozen tulips. How many dozen flowers did she pick?

18. From a bunch of bananas containing $8\frac{5}{6}$ dozen a dealer sold $2\frac{1}{2}$ dozen. How many dozen had he left?

WRITTEN EXERCISES

163. Add and subtract:

1.	2.	3.	4.	5.
$42\frac{5}{6}$	$36\frac{1}{2}$	$52\frac{5}{6}$	$63\frac{1}{3}$	$38\frac{2}{3}$
$28\frac{1}{2}$	$14\frac{1}{6}$	$34\frac{1}{3}$	$25\frac{1}{6}$	$19\frac{1}{6}$

Add:

6.	7.	8.	9.	10.
$14\frac{1}{2}$	$31\frac{5}{6}$	$48\frac{2}{3}$	$27\frac{1}{3}$	$64\frac{1}{6}$
$25\frac{1}{6}$	$9\frac{1}{3}$	$6\frac{1}{6}$	$12\frac{1}{6}$	$5\frac{1}{2}$
$46\frac{1}{2}$	$24\frac{1}{6}$	$37\frac{1}{3}$	$42\frac{1}{6}$	$13\frac{5}{6}$

Find answers:

11. $12\frac{1}{3}+25\frac{5}{6}+8\frac{2}{3}$

12. $75-13\frac{1}{6}-24\frac{2}{3}$

13. $4\frac{5}{6}+29\frac{1}{2}-14\frac{1}{6}$

14. $88\frac{2}{3}-17\frac{1}{6}+8\frac{1}{3}$

15. Anna has a flower bed in the shape of a triangle, the sides being $22\frac{1}{3}$ feet, $19\frac{5}{6}$ feet, and $21\frac{2}{3}$ feet long. How far is it around the bed?

16. Homer threw a baseball $40\frac{2}{3}$ yards, and Alfred $38\frac{1}{6}$ yards. How much farther did Homer throw it than Alfred?

17. Louise is $28\frac{1}{2}$ years younger than her mother. How old is her mother, if Louise is $9\frac{1}{6}$ years old?

How old will Louise be in $23\frac{2}{3}$ years?

164. Finding parts of numbers.

1. How many are $\frac{1}{3}$ of 6? $\frac{2}{3}$ of 6? $\frac{3}{3}$ of 6?

2. Find $\frac{1}{4}$ of 12; $\frac{2}{4}$ of 12; $\frac{3}{4}$ of 12; $\frac{4}{4}$ of 12.

3. How many are $\frac{1}{5}$ of 20? $\frac{2}{5}$ of 20? $\frac{3}{5}$ of 20? $\frac{4}{5}$ of 20? $\frac{5}{5}$ of 20?

4. Find $\frac{1}{6}$ of 30; $\frac{2}{6}$ of 30; $\frac{3}{6}$ of 30; $\frac{4}{6}$ of 30; $\frac{5}{6}$ of 30; $\frac{6}{6}$ of 30.

EXERCISES

165. 1. Find $\frac{5}{6}$ of 42.

$\frac{1}{6}$ of $42 = 7$; $\frac{5}{6}$ of $42 = 5$ times $7 = 35$.

Find:

2. $\frac{2}{3}$ of 15
3. $\frac{3}{4}$ of 40
4. $\frac{2}{5}$ of 45
5. $\frac{2}{3}$ of 27
6. $\frac{4}{5}$ of 20
7. $\frac{5}{6}$ of 36
8. $\frac{2}{3}$ of 18
9. $\frac{2}{5}$ of 40
10. $\frac{5}{6}$ of 48
11. $\frac{3}{5}$ of 25
12. $\frac{3}{4}$ of 24
13. $\frac{2}{5}$ of 45
14. $\frac{3}{5}$ of 40
15. $\frac{3}{4}$ of 32
16. $\frac{4}{5}$ of 50
17. $\frac{5}{6}$ of 54

18. Find the weight of $\frac{4}{5}$ of a 30-pound cheese.

19. Find the cost of $\frac{2}{3}$ of a dozen eggs at 21 cents a dozen.

20. How much will $\frac{3}{4}$ of a pound of coffee cost at 36 cents a pound?

21. George paid 35 cents for a ball and $\frac{2}{5}$ as much for a bat. How much did the bat cost?

22. If it takes William $\frac{5}{6}$ of an hour to walk to school, how many minutes is he on the way?

WRITTEN EXERCISES

166. 1. Find $\frac{3}{4}$ of 572.

$$\begin{array}{r} 4)572 \\ 143 \\ \times\ 3 \\ \hline 429 \end{array}$$

We find $\frac{1}{4}$ of 572 by dividing 572 by 4. $\frac{1}{4}$ of $572 = 143$; $\frac{3}{4}$ of $572 = 3$ times $143 = 429$.

Find:

2. $\frac{2}{3}$ of 168
3. $\frac{2}{5}$ of 145
4. $\frac{3}{4}$ of 224
5. $\frac{4}{5}$ of 250
6. $\frac{5}{6}$ of 720
7. $\frac{3}{5}$ of 455
8. $\frac{2}{3}$ of 516
9. $\frac{3}{4}$ of 896
10. $\frac{2}{3}$ of 762
11. $\frac{3}{4}$ of 624
12. $\frac{3}{5}$ of 845
13. $\frac{5}{6}$ of 936

14. George can run $\frac{4}{5}$ as fast as Edward. How far can George run while Edward is running 55 yards?

15. A park contained 63 elm trees and $\frac{2}{3}$ as many maple trees. How many maple trees did it contain?

16. Henry has 350 stamps, and Frank has $\frac{3}{5}$ as many. How many stamps has Frank?

17. Helen counted 225 roses in the garden, and $\frac{2}{5}$ of them were white. How many white roses were there?

18. Stephen's kite string is 120 yards long, and Arthur's is $\frac{5}{6}$ as long. How long is Arthur's kite string?

19. Our snowball bush bore 90 snowballs this year. We gave away $\frac{3}{5}$ of them. How many did we give away?

20. Mr. Avery's salary is \$984 a year, and his expenses are $\frac{3}{4}$ as much. How much are his expenses a year?

MULTIPLICATION

EXERCISES

167. Multiply at sight:

1.	72	840	71	410	81	622
	3	2	7	8	8	4
2.	61	711	906	843	709	823
	6	9	4	2	5	3
3.	85	475	94	386	80	792
	10	10	10	10	10	10

4. If 2 hats cost \$3, how much will 20 hats cost at the same price?

20 hats are —— times 2 hats.
20 hats will cost —— times \$3, or ——.

5. How long will it take a boy to work 42 problems at the rate of 6 problems in 5 minutes?

6. If a woman can make 4 buttonholes in 10 minutes, how long will it take her, at that rate, to make 36?

7. If 2 pairs of shoes cost \$7, how much will a dozen pairs cost at the same price per pair?

8. A man earns \$3 in 8 hours. At that rate how much will he earn in 72 hours?

9. Find the charge for telephoning 18 minutes between two distant places at \$5 for every 3 minutes.

WRITTEN EXERCISES

168. Multiply:

1. 465 × 5	2. 574 × 6	3. 867 × 6	4. 745 × 7	5. 684 × 7
6. 527 × 8	7. 488 × 9	8. 789 × 8	9. 867 × 9	10. 994 × 9

11. Multiply \$4.86 by 5.

\$4.86 × 5 = \$24.30

Multiply 486 by 5, placing a decimal point in the product under the other decimal point. Write the dollar sign before the dollars of the product. Read the product.

Multiply:

12. \$2.40 × 6	13. \$3.25 × 7	14. \$1.44 × 8	15. \$7.75 × 4
16. \$5.75 × 7	17. \$9.89 × 4	18. \$7.65 × 4	19. \$9.27 × 5
20. \$6.85 × 5	21. \$0.95 × 4	22. \$3.66 × 6	23. \$8.24 × 6
24. \$0.75 × 8	25. \$4.96 × 7	26. \$6.25 × 8	27. \$9.40 × 6
28. \$7.77 × 7	29. \$4.86 × 8	30. \$1.85 × 9	31. \$2.60 × 9

EXERCISES

169. 1. How many are 2 times 5? 4 times 5? Find the sum of 2 times 5 and 4 times 5.

2. Find the sum of 2 times 5 and 4 times 5, in this way:

2 times 5 and 4 times 5 are 6 times 5, or 30.

Find the sum of:

3. 7 times 2 and 3 times 2.
4. 3 times 4 and 2 times 4.
5. 9 times 6 and 3 times 6.
6. 6×8 and 4×8.
7. 2×7 and 5×7.
8. 4×9 and 6×9.

9. How many 2's are 10×2 and 1×2? What is the sum of 10×2 and 1×2? What is the value of 11×2?

10. Let us find the value of 12×6. How many 6's must be added to ten 6's to give twelve 6's?

$12 \times 6 = 2 \times 6$ added to 10×6, or $60 + 12$, or 72.

11. Find the value of 13×5 as follows:

$13 \times 5 = 3 \times 5$ added to $10 \times 5 =$ ——.

In the same way find the following products:

12. 12×4	17. 13×6	22. 14×3	27. 11×7
13. 12×5	18. 13×7	23. 14×5	28. 11×8
14. 12×7	19. 13×4	24. 15×6	29. 11×9
15. 12×8	20. 13×8	25. 16×4	30. 16×6
16. 12×9	21. 13×9	26. 17×3	31. 18×5

32. A street car conductor had 16 5-cent pieces in one pocket. How much money had he in that pocket?

33. Find the cost of 18 rockets at 3 cents each.

WRITTEN EXERCISES

170. 1. Multiply 43 by 12.

	43	43
	12	12
2 times 43 . . .	86	86 (units)
10 times 43 . . .	430	43 (tens)
12 times 43 . . .	516	516

Explain the first process.

What figure has been omitted from the second process?

In the second process we multiply 43 by 2 (units) and write the product 86 as *units* by placing 6 in units' column.

We then multiply 43 by 1 (ten) and write the product 43 as *tens* by placing 3 in tens' column.

The right-hand figure of each product is written under the figure by which we are multiplying.

Multiply:

2. 32 by 12	6. 35 by 13	10. 64 by 15	14. 31 by 19
3. 41 by 12	7. 27 by 14	11. 33 by 16	15. 50 by 18
4. 56 by 11	8. 62 by 15	12. 18 by 17	16. 84 by 16
5. 51 by 13	9. 73 by 14	13. 22 by 18	17. 92 by 15

18. Multiply 34 by 20.

34	0 (units) times 34 = 0 (units). Write 0
20	in units' place in the product. 2 (tens)
680	times 34 = 68 (tens). Write 68 before the 0.

Multiply

19. 24	20. 32	21. 45	22. 42	23. 36
20	30	30	40	50
24. 72	25. 84	26. 36	27. 49	28. 66
60	60	70	80	90

29. Multiply 62 by 23 and test the result.

62	23
23	62
186	46
124	138
1426	1426

Test. — The correctness of the result obtained by multiplying 62 by 23 may be tested by multiplying 23 by 62 as in the second process.

Multiply, and test results:

30. 45	31. 75	32. 61	33. 92	34. 66
24	25	32	31	39
35. 54	36. 58	37. 94	38. 51	39. 68
45	48	29	49	55
40. 64	41. 94	42. 77	43. 82	44. 83
63	69	71	75	79

Multiply:

45. 85 by 81	47. 99 by 88	49. 225 by 12
46. 96 by 95	48. 132 by 11	50. 275 by 13

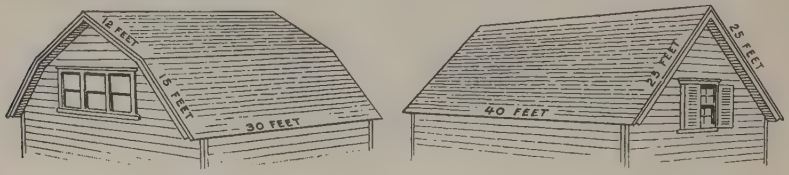
Multiply:

51. 462 by 14	57. 122 by 69	63. \$2.65 by 39
52. 585 by 15	58. 118 by 78	64. \$6.25 by 14
53. 332 by 25	59. 106 by 81	65. \$0.96 by 92
54. 261 by 31	60. \$1.08 by 88	66. \$5.75 by 17
55. 128 by 47	61. \$4.27 by 23	67. \$3.64 by 26
56. 135 by 52	62. \$0.75 by 84	68. \$2.88 by 29

WRITTEN EXERCISES

171. 1. Find the cost of 4 pairs of skates at \$1.50 per pair.

2. Which of these roofs has the greater area and how much greater?



3. There are 30 dozen eggs in a case. How many dozen eggs are there in 18 cases?

4. How many crates of strawberries are there on a train of 20 cars, each of which contains 225 crates?

5. How much must be paid for 50 crates of strawberries at \$2.85 per crate?

6. A man bought 44 crates of cantaloupes at \$2.50 per crate, and sold them at \$3.15 per crate. How much did he gain on each crate? on all?

DIVISION

EXERCISES

172. Divide at sight:

1. 7)28 3)24 2)14 5)35 4)36 6)54 8)64 9)63

2. 3)189 2)168 4)1648 7)217 6)4260 9)4590

3. 7)2877 6)3066 2)1462 8)4088 3)1536 9)2709

Answer quickly:

4. $\frac{1}{2}$ of 18 = $\frac{1}{3}$ of 15 = $\frac{1}{4}$ of 20 = $\frac{1}{5}$ of 50 =

5. $\frac{1}{3}$ of 21 = $\frac{1}{4}$ of 24 = $\frac{1}{5}$ of 35 = $\frac{1}{6}$ of 24 =

6. $\frac{1}{4}$ of 120 = $\frac{1}{2}$ of 88 = $\frac{1}{3}$ of 960 = $\frac{1}{5}$ of 100 =

7. $\frac{1}{6}$ of 1200 = $\frac{1}{3}$ of 636 = $\frac{1}{4}$ of 2408 = $\frac{1}{5}$ of 1550 =

8. If 3 valentines cost 10 cents, how many valentines of the same kind can you buy for 40 cents?

9. Eliza bought 6 small flags for 5 cents. At the same price how many could she have bought for 25 cents?

10. One Saturday Hiram saw 24 robins and $\frac{1}{6}$ as many bluebirds. How many bluebirds did he see?

11. John planted 40 beans, but only $\frac{4}{5}$ of them came up. How many did not come up?

12. Lewis had 20 cents, which he expended for glass marbles at 4 for 5 cents. How many did he buy?

13. Anna has 21 cents to buy Easter cards. How many can she buy at 3 for 7 cents?

WRITTEN EXERCISES

173. Divide, testing each answer:

1.	2.	3.	4.
4)1824	6)3462	7)4466	8)5456
5.	**6.**	**7.**	**8.**
7)5292	6)2970	5)4445	9)5553
9.	**10.**	**11.**	**12.**
\$8)\$7168	\$9)\$7074	\$8)\$7832	\$9)\$8883

13. Find $\frac{1}{4}$ of \$38.72, or divide \$38.72 by 4.

4)\$38.72
\$9.68

Divide 3872 by 4, placing a decimal point in the result under the other decimal point. Write the dollar sign before the dollars of the answer. Read the answer.

Test. — 4 times \$9.68 = \$38.72.

Find the value of the following, testing each answer:

14. $\frac{1}{2}$ of \$7.44	**17.** $\frac{1}{3}$ of \$17.55	**20.** $\frac{1}{6}$ of \$20.22
15. $\frac{1}{3}$ of \$9.24	**18.** $\frac{1}{5}$ of \$27.45	**21.** $\frac{1}{5}$ of \$48.85
16. $\frac{1}{4}$ of \$3.72	**19.** $\frac{1}{4}$ of \$31.68	**22.** $\frac{1}{6}$ of \$59.82

Divide:

23. \$55.44 by 6	**28.** \$55.58 by 7	**33.** \$47.75 by 5
24. \$64.75 by 7	**29.** \$47.34 by 9	**34.** \$97.35 by 5
25. \$4374 by \$6	**30.** \$31.12 by 8	**35.** \$78.64 by 8
26. \$7452 by \$6	**31.** \$96.30 by 9	**36.** \$80.82 by 9
27. \$5288 by \$8	**32.** \$99.92 by 8	**37.** \$79.76 by 8

174. Multiply:

1. $\begin{array}{r} 11 \\ \underline{1} \end{array}$ $\begin{array}{r} 11 \\ \underline{2} \end{array}$ $\begin{array}{r} 11 \\ \underline{3} \end{array}$ $\begin{array}{r} 11 \\ \underline{4} \end{array}$ $\begin{array}{r} 11 \\ \underline{5} \end{array}$ $\begin{array}{r} 11 \\ \underline{6} \end{array}$ $\begin{array}{r} 11 \\ \underline{7} \end{array}$ $\begin{array}{r} 11 \\ \underline{8} \end{array}$ $\begin{array}{r} 11 \\ \underline{9} \end{array}$

Divide:

2. $11\overline{)44}$ $11\overline{)55}$ $11\overline{)77}$ $11\overline{)110}$ $11\overline{)88}$ $11\overline{)99}$

3. $11\overline{)22}$ $11\overline{)220}$ $11\overline{)33}$ $11\overline{)220+33}$ $11\overline{)253}$

WRITTEN EXERCISES

1. Divide 253 by 11.

	23, quotient	23
	11)253	11)253
Subtract	$20 \times 11 = 220$	22
	33 left to be divided	33
Subtract	$3 \times 11 = 33$	33
	0	

How many 11's are subtracted from 253 the first time? How many more 11's are subtracted afterwards? How many 11's are subtracted in all? Can more 11's be subtracted? Then how many 11's are there in 253?

The five steps in dividing

(1) Divide . . . Thus, in shorter process, $25 \div 11 = 2$
(2) Write quotient figure . . . . . Write 2
(3) Multiply . . . . . $2 \times 11 = 22$
(4) Subtract . . . . . $25 - 22 = 3$
(5) Bring down next figure . . . . $3 \text{ tens} + 3 = 33$

Test. — 11×23 or 23×11 should give 253, the number divided.

Point out the steps in the following:

2.
$$\begin{array}{r} 672 \\ 11\overline{)7392} \\ 66 \\ \hline 79 \\ 77 \\ \hline 22 \\ 22 \\ \hline \end{array}$$

3.
$$\begin{array}{r} 563 \\ 11\overline{)6193} \\ 55 \\ \hline 69 \\ 66 \\ \hline 33 \\ 33 \\ \hline \end{array}$$

4.
$$\begin{array}{r} 718 \\ 11\overline{)7898} \\ 77 \\ \hline 19 \\ 11 \\ \hline 88 \\ 88 \\ \hline \end{array}$$

Divide:

5. $11\overline{)473}$ **7.** $11\overline{)286}$ **9.** $11\overline{)2585}$ **11.** $11\overline{)5951}$

6. $11\overline{)385}$ **8.** $11\overline{)517}$ **10.** $11\overline{)3586}$ **12.** $11\overline{)4598}$

13. Divide 420 by 12.

$$\begin{array}{r} 4* \\ 12\overline{)420} \\ 48 \end{array}$$

Quotient too large

$$\begin{array}{r} 2* \\ 12\overline{)420} \\ 24 \\ \hline 18 \end{array}$$

Quotient too small

$$\begin{array}{r} 35 \\ 12\overline{)420} \\ 36 \\ \hline 60 \\ 60 \\ \hline \end{array}$$

Since 42 contains 10 only 4 times, 42 does not contain 12 more than 4 times, but perhaps only 2 or 3 times.

The first figure of the quotient cannot be 4, for 48 cannot be subtracted from 42. It is not 2, for the remainder 18, being larger than 12, will contain 12 again. It is 3, for 3×12 *can be subtracted from* 42, and the *remainder* 6 *is less than* 12.

Since $60 \div 10 = 6$, try 5 for the second figure of the quotient. Since $5 \times 12 = 60$, there is no remainder. Then the quotient is 35.

Divide and test:

14. $12\overline{)276}$ 16. $12\overline{)636}$ 18. $12\overline{)2580}$ 20. $12\overline{)1704}$

15. $12\overline{)384}$ 17. $12\overline{)528}$ 19. $12\overline{)2808}$ 21. $12\overline{)5052}$

Find quotients:

22. $616 \div 11$ 26. $957 \div 11$ 30. $1404 \div 12$

23. $648 \div 12$ 27. $912 \div 12$ 31. $2100 \div 12$

24. $803 \div 11$ 28. $1353 \div 11$ 32. $2057 \div 11$

25. $564 \div 12$ 29. $3465 \div 11$ 33. $6248 \div 11$

175. Divide:

1. $2\underline{)6}$ $\$2\underline{)\$6}$ 2 tens$\underline{)6 \text{ tens}}$ $20\underline{)60}$
   — times — times — times — times

2. $3\underline{)12}$ 3 dimes$\underline{)12 \text{ dimes}}$ 3 tens$\underline{)12 \text{ tens}}$ $30\underline{)120}$

3. $4\underline{)8}$ 4 doz.$\underline{)8 \text{ doz.}}$ 4 tens$\underline{)8 \text{ tens}}$ $40\underline{)80}$ $40\underline{)800}$

WRITTEN EXERCISES

1. Divide 840 by 20.

$2\not{0}\overline{)84\not{0}}$
42

840 = 84 tens; 20 = 2 tens.

84 tens contains 2 tens as many times as 84 contains 2.

Then cut off or cancel the last figure of each number and divide 84 by 2. What is the quotient?

Divide:

2. 640 by 20	8. \$650 by \$50	14. 720 by 60
3. 960 by 30	9. \$420 by \$60	15. 490 by 70
4. 750 by 30	10. \$870 by \$30	16. 540 by 90
5. 360 by 20	11. \$1200 by \$50	17. 5600 by 80
6. 760 by 40	12. \$1560 by \$40	18. 5120 by 80
7. 350 by 50	13. \$3450 by \$50	19. 6580 by 70

20. Divide 1395 by 31.

$$\begin{array}{r} 45 \\ 31\overline{)1395} \\ \underline{124} \\ 155 \\ \underline{155} \end{array}$$

31 is not contained in 1 nor in 13, but is contained in 139 about as many times as 30 is contained in 139, or about as many times as 3 is contained in 13, or 4 times.

Write 4 in the quotient over 9, the last figure of 1395 used. Multiply 31 by 4, giving 124. Subtract 124 from 139, giving 15 for a remainder. Does this remainder show that 4 is the correct figure in the quotient? Tell why.

Tell how the process is completed. Test the answer.

Find quotients and test:

21. $525 \div 21$	28. $1071 \div 21$	35. $1364 \div 22$
22. $672 \div 21$	29. $1147 \div 31$	36. $1088 \div 32$
23. $744 \div 31$	30. $1224 \div 51$	37. $1134 \div 42$
24. $496 \div 31$	31. $2132 \div 41$	38. $1872 \div 52$
25. $945 \div 21$	32. $2601 \div 51$	39. $1664 \div 52$
26. $943 \div 41$	33. $1488 \div 31$	40. $1536 \div 32$
27. $682 \div 22$	34. $1100 \div 22$	41. $2444 \div 52$

Divide:

42. 5661 by 51	50. 1672 by 22	58. 8601 by 61
43. 6500 by 52	51. 2079 by 21	59. 8733 by 71
44. 9828 by 42	52. 2728 by 31	60. 9020 by 82
45. 9922 by 41	53. 3040 by 32	61. 2976 by 62
46. 7392 by 32	54. 2856 by 42	62. 4608 by 72
47. 9982 by 31	55. 3567 by 41	63. 3645 by 81
48. 9086 by 22	56. 4284 by 51	64. 3094 by 91
49. 9345 by 21	57. 3900 by 52	65. 4784 by 92

WRITTEN EXERCISES

176. 1. If a gallon of choice maple sirup costs $1.12, how much will a quart of it cost at the same price?

2. Mrs. Day bought half a dozen spoons for $3.90. How much did they cost apiece?

3. Philip bought an 8-pound basket of cherries for $1.20. How much did he pay for them per pound?

4. A fruit grower packed 3000 pears in boxes holding 60 pears each. How many boxes did he use?

5. A man boarded 8 days at a hotel and was charged $20.00. How much did it cost him a day?

6. Dora's hoop rolls 11 feet in making one turn. How many turns will it make in going 154 feet?

7. I have 1001 strawberry plants to set out in 11 rows. How many plants are there for each row?

8. There were 132 bananas in a bunch. How many dozen bananas were there in the bunch?

REVIEW

EXERCISES

177. Add at sight:

1.	\$1.23	\$2.25	\$0.26	\$1.60	\$0.60
	.30	.33	1.40	.25	.40
2.	\$2.70	\$3.25	\$4.24	\$3.26	\$1.30
	.14	.41	.44	.70	.55
3.	20	122	31	48	347
	264	36	705	250	21
4.	50¢	50¢	80¢	80¢	70¢	70¢	40¢
	50¢	60¢	20¢	40¢	30¢	50¢	90¢
5.	10	$11\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$6\frac{1}{2}$	$\frac{1}{2}$	$2\frac{2}{3}$
	$1\frac{1}{2}$	$\frac{1}{2}$	2	$\frac{1}{4}$	11	$4\frac{1}{2}$	$\frac{1}{3}$
6.	$4\frac{1}{3}$	$6\frac{1}{3}$	$22\frac{1}{6}$	$4\frac{5}{6}$	$1\frac{5}{6}$	$16\frac{1}{2}$	$\frac{5}{6}$
	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{1}{6}$	13	$\frac{1}{6}$	$\frac{1}{2}$	$27\frac{1}{6}$

Subtract at sight:

7.	\$1.50	\$2.75	\$3.87	\$5.66	\$2.98
	.40	.25	.37	.45	.50
8.	\$2.56	\$0.99	\$3.56	\$7.48	\$4.29
	.43	.83	.05	.15	.25

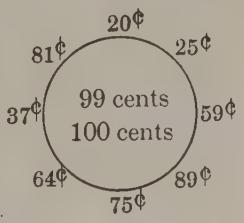
Tell the missing numbers or amounts of money:

9. 80 + ____ = 100	10. 75 − ____ = 50	11. 40 + ____ = 65	12. 32 + ____ = 52	13. 100 − ____ = 50
14. \$1.00 − .50 = \$	15. \$ − .60 = \$.40	16. \$ − .80 = \$.70	17. \$1.00 − .70 = \$	18. \$1.50 + ____ = \$2.00
19. 1 + ____ = $1\frac{2}{3}$	20. 3 − ____ = $2\frac{1}{2}$	21. $5\frac{1}{2}$ + ____ = 6	22. $3\frac{1}{4}$ + ____ = $3\frac{3}{4}$	23. $2\frac{1}{6}$ + ____ = $3\frac{5}{6}$

24. \$1 − \$$\frac{1}{2}$ = \$——, or ——¢.

25. \$1 − \$$\frac{3}{4}$ = \$——, or ——¢.

26. \$$\frac{1}{4}$ + \$—— = \$$\frac{3}{4}$, or ——¢.



27. Add each number of cents outside the ring to 100 cents, or \$1, and then to 99 cents. Give answers in dollars and cents. Add rapidly in either direction.

28. Next subtract each number of cents outside the ring from 99 cents and then from \$1, or 100 cents. Give answers in cents. Subtract rapidly in either direction.

Subtract from 99¢, then from \$1:

29. 79¢	32. 58¢	35. 55¢	38. 84¢
30. 69¢	33. 88¢	36. 85¢	39. 76¢
31. 49¢	34. 68¢	37. 35¢	40. 43¢

Find the cost of:

41. 3 dozen camera films @ 40¢.

This means "3 dozen camera films at 40 cents a dozen."

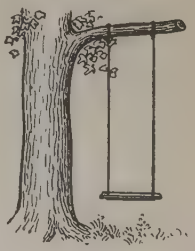
42. Developing 4 films at 24¢ a dozen.

43. Printing and mounting 7 photographs @ 9¢.

44. 2 tennis balls at 30¢ each; and a racket, $2.25.

45. A baseball, 25¢; a bat, 20¢; and a glove, 80¢.

46. A fishing rod, 95¢; hooks, 5¢; and a line, 10¢.



47. How much rope does Ralph need to make a swing like this? It reaches to within 1 foot of the ground. The limb is 15 feet from the ground. The sides are $2\frac{1}{2}$ feet apart. It takes $3\frac{1}{2}$ feet of rope to tie both ends of the rope to the limb.

48. A grocer bought raspberries at 9¢ a box and sold them at $12\frac{1}{2}$¢ a box. How much did he gain on every box that he sold?

49. If 3 boxes of strawberries cost a quarter of a dollar, how much will a dozen boxes cost at this price?

50. Miss Smiley bought 6 bunches of rhubarb at 7¢ for 2 bunches. How much did she expend for rhubarb?

51. If a dozen eggplants cost 90¢, how much will 4 plants cost at the same price?

52. If 3 bunches of beets cost 5¢, how many bunches at this price can be bought for half a dollar?

53. If 5 bunches of mint cost 30¢, how much will 9 bunches cost at the same price a bunch?

WRITTEN EXERCISES

178. 1. Write in figures and add: six dollars eight cents, seventeen dollars, ten dollars seventy-five cents, eight dollars seven cents, ninety-two cents.

Add the following, testing the sum of each column as you find it:

2.	3.	4.	5.	6.
$18.45	$68.27	$29.90	$77.67	$58.00
6.96	9.39	.87	16.08	6.86
28.79	15.83	40.66	4.82	27.99

7.	8.	9.	10.	11.
$39.95	$17.77	$12.00	$29.95	$35.99
8.49	9.36	8.85	8.78	9.87
6.67	8.98	7.76	7.89	7.97
16.84	7.69	.95	9.88	16.89
.88	8.67	8.57	7.96	.85
8.75	38.84	9.29	.99	18.85

12.	13.	14.	15.	16.
$36.64	$18.81	$16.68	$27.00	$42.75
8.85	8.98	6.79	6.95	8.55
13.37	17.96	5.99	7.88	9.95
9.69	7.87	12.09	9.99	9.85
7.89	6.49	8.69	4.97	8.95
9.58	8.89	9.21	8.98	9.95
10.67	7.95	20.65	2.99	9.95

Subtract:

17.	18.	19.	20.	21.
$10.00	$10.00	$10.00	$10.00	$10.00
8.68	7.85	9.62	9.23	8.55

22.	23.	24.	25.	26.
$20.00	$20.00	$15.00	$25.00	$50.00
18.75	15.67	12.70	22.52	47.25

Multiply:

27. 78 by 64
28. 96 by 73
29. 89 by 56
30. 87 by 78
31. 223 by 36
32. 119 by 59
33. 176 by 48
34. 365 by 27
35. 92 by 85
36. 89 by 89
37. 96 by 95
38. 99 by 94

Divide:

39. 4386 by 51
40. 4828 by 71
41. 4650 by 62
42. 4779 by 81
43. 4992 by 52
44. 5538 by 71
45. 5734 by 61
46. 5332 by 62
47. 6039 by 61
48. 4176 by 72
49. 6561 by 81
50. 5904 by 72
51. 8281 by 91
52. 7872 by 82
53. 8740 by 92

Find answers:

54. 30×24
55. 40×81
56. 60×75
57. 70×32
58. 80×47
59. $740 \div 20$
60. $760 \div 40$
61. $\$1050 \div \$70$
62. $\$1120 \div \$80$
63. $\$3330 \div \$90$
64. $\frac{2}{5}$ of $14.80
65. $\frac{2}{3}$ of $16.50
66. $\frac{3}{4}$ of $11.76
67. $\frac{4}{5}$ of $21.45
68. $\frac{5}{6}$ of $38.10

69. One day this shoemaker did the following work:

Soling and heeling 1 pair men's shoes, \$1.25, and 2 pairs ladies' shoes @ 75¢; sewing 4 seams @ 10¢; 3 patches, 10¢, 15¢, 20¢. How much did he receive for this work?

70. Find the receipts that day for the work of an assistant: 1 pair sewed oak taps, \$1.00; 2 pairs nailed taps @ \$.75; 3 pairs leather heels @ \$.25.

71. Another assistant put on a pair of rubber soles and heels, \$1.50; 3 pairs rubber heels @ \$.50; and cemented 3 patches @ 10¢. Find the receipts for his work.

72. Find the total receipts of the shop that day.

Find the cost of the following tools and supplies:

73. 4 knives @ 13¢; 2 hammers @ 30¢; 2 heel burnishers, 25¢ and 40¢; 3 shoe rasps @ 35¢; 2 doz. awls @ 10¢.

74. A side of sole leather, 27 lb. @ \$.33; 8 lb. patches @ \$.38; 4 doz. pairs half soles @ \$2.25, and $\frac{3}{4}$ doz. pairs @ \$3.20.

75. 10 balls thread at \$.25 for 2 balls; $\frac{1}{2}$ doz. balls wax @ 10¢; 4 oz. bristles @ \$.85.

76. 3 qt. pegs @ 5¢; 4 lb. nails @ 4¢; 8 lb. nails @ 10¢.

77. 5 lb. sheet rubber @ \$.55; 3 bottles cement @ 9¢; 12 pairs rubber heels @ \$.20.

EXERCISES

179. Make and solve problems about the following.

1. Ruth is $9\frac{1}{2}$ years old; Pauline is $8\frac{1}{2}$ years old.

2. A boy had $\$1\frac{1}{4}$ and afterward spent $\$\frac{1}{2}$.

3. A girl bought a pie, ate $\frac{1}{4}$ of it, and gave $\frac{1}{4}$ away.

4. Alfred had 42 marbles. He lost $\frac{1}{6}$ of them.

5. Horace bought some tissue paper for a kite at 3 sheets for 2 cents.

6. The tail of Horace's kite was 6 yards long at first. Afterward Horace cut off 4 feet of it.

7. The kite string was 180 feet long. We often measure string in yards.

8. Edward spent $\frac{1}{2}$ of his money for a goat and $\frac{1}{6}$ of his money for a wagon.

9. Patrick had \$1 and bought several rosebushes at 20 cents each.

10. Julia planted 300 sweet peas. Some did not come up.

11. It takes 3 weeks for eggs to hatch into chickens. The hen has been sitting 9 days.

12. Edna and Mabel colored 2 dozen eggs for Easter. One third of them were red and two thirds were blue.

13. A horse can gallop 20 miles in 2 hours.

14. Frank has 60 cents. The price of oranges is 3 for 10¢. The price of bananas is 20¢ a dozen.

15. Some berry pickers picked $8\frac{1}{2}$ crates of strawberries in the forenoon and $4\frac{1}{2}$ crates in the afternoon.

PART III

READING AND WRITING NUMBERS

180. 1. Count by *tens* to 100; by *hundreds* to 1000; by *thousands* to 10,000; by *ten-thousands* to 100,000 (100 thousand); by *hundred-thousands* to 1,000,000 (1000 thousand, or 1 **million**).

2. How many tens are there in 100? hundreds in 1000? thousands in 10,000? ten-thousands in 100,000? hundred-thousands in 1,000,000?

3. Count by thousands from 10 thousand to 20 thousand, thus: "10 thousand, 11 thousand, 12 thousand," etc.

Count by thousands from 40,000 to 50,000.

4. To help in reading numbers, we use commas to separate the figures into groups of three, beginning at the right.

These groups are called **periods**.

There may be only one or two figures in the left period.

5. Read:

20,000	22,000	36,000	80,000	125,000
21,000	25,000	57,000	99,000	342,000

6. Write in figures:

Thirty thousand.	Ninety-nine thousand.
Thirty-eight thousand.	One hundred thousand.
Seventeen thousand.	Nine hundred sixty thousand.
Forty-seven thousand.	One million.

7. The number 264,895 is composed of 264 *thousands*, and 895 units; and is read, "Two hundred sixty-four *thousand*, eight hundred ninety-five."

EXERCISES

181. 1. Read, and then write in words:

19,632	40,285	278,718	580,058
52,969	64,047	352,387	709,045
94,151	56,309	485,704	920,004
73,100	81,006	246,070	800,025

2. Write in columns, with units under units, tens under tens, etc.:

Seventy-five thousand.
Eighty-seven thousand, one.
Twenty-six thousand, thirty.
Sixty thousand, four hundred eighteen.
Forty-four thousand, eight hundred seventy.
Ninety-seven thousand, three hundred fifty-two.
One hundred seven thousand, three hundred ninety.
Five hundred thirty thousand, eighty-three.
Nine hundred sixteen thousand, five hundred four.
Six hundred thousand, four hundred sixty-seven.
Three hundred sixty-five thousand, fifteen.
Four hundred seventy-eight thousand six hundred seventy-seven.
Seven hundred eighty-three thousand, eight hundred thirty-four.
Nine hundred ninety-nine thousand, nine hundred ninety-nine.

ADDITION AND SUBTRACTION

EXERCISES

182. Add and subtract rapidly:

1.	38	43	55	72	94	69	51	86
	10	30	20	40	60	30	40	50
2.	65	72	98	56	84	93	78	67
	40	30	60	20	50	40	20	40

3. $\begin{array}{r} 47 \\ +25 \end{array}$ First add the tens of one number to the whole of the other and then the units to that result, thus: $47+20=67$; $67+5=72$.

Add rapidly in this way: "47, 67, 72."

In the same way add:

4.	48	24	43	36	22	55	77	31
	15	38	29	35	69	38	17	49
5.	34	65	28	57	48	64	26	88
	59	25	43	29	38	27	66	19

Subtract rapidly in this way: "85, 25, 19."

6.	85	32	56	45	78	33	92	84
	66	14	28	17	49	16	57	69
	72	61	43	57	94	62	47	73
	48	35	25	38	46	35	29	36

8. Two electric cars were chartered for 83 children for an excursion to Ocean Beach. 45 rode in the first car. How many rode in the second?

9. Thirty-six minutes after starting they reached Castle Rock, and after another period of 48 minutes they arrived at Ocean Beach. How long were they on the way?

10. The conductor said that it was 18 miles to Castle Rock and 25 miles farther to Ocean Beach. How far was it to Ocean Beach?

11. The children collected 37 starfish and 25 sea urchins. How many sea animals did they collect?

12. They collected 44 different kinds of shells for their school cabinet, which already contained 26 of these kinds. How many new kinds did they find?

13. They collected 55 specimens of rock, but kept only 17 of them for the cabinet. How many did they throw away?

EXERCISES

183. 1. Count by 2's from 1 to 99; by 3's from 2 to 98; by 4's from 3 to 99; by 5's from 4 to 99.

2. Count by 6's from 1 to 97; from 3 to 99. Count by 7's from 2 to 100; from 5 to 96.

3. Count by 8's from 4 to 100; from 7 to 95. Count by 9's from 5 to 95; from 8 to 98.

4. From 100 count backward by 2's to 0; by 3's to 1; by 4's to 0; by 5's to 0; by 6's to 4; by 7's to 2; by 8's to 4; by 9's to 1.

These columns have been added and tested in less than 2 minutes. Practice until you can do as well or better.

5.	6.	7.	8.	9.	10.	11.	12.
3	7	1	9	5	8	7	9
4	6	2	8	2	7	6	8
6	0	3	2	9	9	5	9
9	8	4	1	7	7	9	8
7	5	5	4	3	9	4	7
2	2	6	7	4	8	8	8
5	7	7	3	6	9	3	9
4	1	8	6	7	8	9	9
8	3	9	5	2	7	1	8
7	9	4	7	8	8	5	7
3	5	5	4	9	7	8	9

EXERCISES

184. Tell answers at sight:

1.	$3\frac{1}{2}$	$8\frac{3}{4}$	$2\frac{1}{3}$	$7\frac{5}{6}$	$6\frac{1}{4}$	$4\frac{1}{6}$	$9\frac{2}{3}$
	$+5\frac{1}{2}$	$-4\frac{1}{4}$	$+5\frac{1}{3}$	$-3\frac{1}{6}$	$-2\frac{1}{4}$	$+5\frac{1}{6}$	$-7\frac{1}{3}$
2.	55	43	78	61	89	34	95
	-32	$+26$	-34	$+28$	-54	$+63$	-44
3.	75	63	47	54	25	67	82
	$+34$	$+76$	$+81$	$+93$	$+84$	$+72$	$+67$
4.	103	126	114	165	148	153	137
	-43	-36	-54	-85	-63	-71	-45

EXERCISES IN MAKING CHANGE

185. In these exercises use toy money, if it is obtainable; if not, use colored slips of paper — a different color for each coin. Write on each slip its value.

Give each pupil, except the storekeeper, a dollar and two half dollars. The storekeeper may have several of these coins; also quarter dollars, dimes, 5-cent pieces, and 1-cent pieces.

Let each pupil be the storekeeper for five or ten sales, and let a record be kept of his mistakes, the others keeping close watch of his work and taking turns as buyers. The buyer has first chance to correct errors. If he neglects to do so, it counts against his record for the day, and the class may then make corrections.

When the storekeeper announces the cost, the buyer pays with as few and as small coins as possible. The storekeeper then counts out the change, naming the cost first.

1. Emily buys three cans of corn, 25¢; and 1 lb. of coffee, 39¢. The storekeeper announces the cost, "64 cents." Is he right?

Emily hands him \$1, and he hands back a cent, a dime, and a 25-cent piece, saying as he does so, "64 cents, 65, 75, 1 dollar." Is he right?

2. Buy of the storekeeper 2 doz. pickles @ 10¢.

3. Buy 6 lb. rice at 7¢.

4. Buy 5 qt. beans @ 8¢.

Conduct these exercises as suggested on the previous page and supply others, if needed, by changing prices.

5. 2 lb. tea @ 40¢.

6. 3 lb. honey @ 17¢.

7. 4 lb. almonds @ 18¢.

8. 1 lb. cocoanut, 19¢; and 8 lb. prunes @ 8¢.

9. 10 lb. sugar @ 6¢; and 2 lb. codfish @ 13¢.

10. A pint bottle of olive oil, 35¢; and a pound of baking powder, 60¢.

11. 3 lb. lard @ 14¢; and 1 sack flour, 80¢.

12. $\frac{1}{2}$ lb. chocolate @ 40¢; and 2 lb. mixed nuts @ 18¢.

13. 1 qt. maple sirup @ $1.00 a gal.; and 3 lb. butter @ 30¢.

14. 4 lb. figs @ 15¢; and 5 lb. raisins @ 20¢.

15. 9 doz. clothespins at 5¢ for 3 doz.; and a clothesline, 17¢.

16. 1 doz. bars laundry soap at 25¢ for 6 bars; and $\frac{1}{2}$ doz. cakes toilet soap at 8¢ a cake.

17. 5 lb. cheese @ 16¢; and 4 doz. eggs @ 24¢.

18. 6 boxes breakfast food at 25¢ for 2 boxes; and 8 lb. oatmeal @ 4¢.

19. 3 lb. cornstarch @ 9¢; $\frac{1}{4}$ lb. mustard @ 32¢; and 2 gal. kerosene @ 12¢.

20. 1 lb. dates @ 8¢; 3 doz. oranges @ 40¢; and 1 doz. lemons @ 25¢.

21. Basket of peaches, 75¢; 3 baskets of grapes @ 17¢; and 2 bunches of celery @ 18¢.

WRITTEN EXERCISES

186. The exercises in the first row have been added and tested in less than 4 minutes, and all on the page in less than 15 minutes. Practice until you can do better.

1.	2.	3.	4.	5.
$87.54	$136.49	$275.96	$342.79	$129.88
95.75	24.68	140.03	87.60	241.62
14.63	30.00	9.71	23.94	108.74
28.34	572.14	67.99	209.48	194.16
85.47	98.08	332.48	125.75	237.95
30.45	62.71	96.83	235.22	108.24

6.	7.	8.	9.	10.
$94.86	$124.75	$208.64	$312.17	$189.00
78.09	246.89	100.36	84.03	75.63
7.47	37.41	9.99	9.86	82.97
75.85	90.17	7.58	67.94	245.92
8.93	53.74	215.96	196.16	93.69
69.00	368.43	106.25	58.38	137.05
82.46	241.00	315.45	125.60	100.89

11.	12.	13.	14.	15.
2,341	34,231	57,243	63,789	47,680
1,462	53,645	61,502	25,641	86,239
3,024	12,345	3,426	31,052	14,168
2,232	32,204	7,562	87,465	90,753
5,324	50,631	34,214	46,346	59,646
4,101	27,341	3,623	20,574	76,894
1,234	31,426	84,563	74,683	92,687

Add and subtract:

16. $57\frac{1}{2}$	17. $83\frac{2}{3}$	18. $35\frac{3}{4}$	19. $62\frac{5}{6}$	20. $75\frac{2}{3}$
$32\frac{1}{2}$	$41\frac{1}{3}$	$17\frac{1}{4}$	$28\frac{1}{6}$	$49\frac{2}{3}$
21. $89\frac{3}{4}$	22. $64\frac{1}{2}$	23. $48\frac{5}{6}$	24. $56\frac{1}{2}$	25. $91\frac{5}{6}$
$46\frac{1}{2}$	$35\frac{1}{6}$	$29\frac{1}{3}$	$37\frac{1}{4}$	$53\frac{1}{2}$

26. From 93,064 subtract 57,625.

93,064, **minuend**
57,625, **subtrahend**
35,439, **remainder**

Test. — Add the *remainder* to the *subtrahend*. The sum should equal the *minuend*.

Subtract and test:

Practice until you can do exercises 27–46 *correctly* in less than 5 minutes.

27.	28.	29.	30.	31.
52,849	87,246	20,000	68,930	94,328
24,638	9,384	374	12,598	72,789
32.	33.	34.	35.	36.
$374.60	$506.03	$136.98	$473.56	$213.12
98.73	174.45	59.89	87.95	35.16
37.	38.	39.	40.	41.
$574.33	$304.20	$623.59	$840.00	$419.35
293.84	92.50	45.39	463.25	243.77
42.	43.	44.	45.	46.
$200.00	$646.84	$900.06	$507.13	$724.05
173.20	375.96	85.29	168.19	299.16

WRITTEN EXERCISES

187. 1. The sum of two numbers is 8391, and one of them is 5624. What is the other number?

2. A boy's kite string was broken into three pieces, $32\frac{1}{2}$ yards, $57\frac{1}{4}$ yards, and $41\frac{1}{2}$ yards long. How long was the string?

3. Shakespeare was born in 1564 and died in 1616. How old was he when he died?

4. Floy's watch cost her father \$32.50, and the chain \$12.35. How much change did he receive out of \$50.00?

5. From a 1000-gallon tank of water 573 gallons ran out, and 247 gallons ran in. How many gallons were there then in the tank?

Standing Army of the United States

	Officers	Enlisted Men
Cavalry	750	12,728
Infantry	1500	25,193
Artillery	651	17,762

6. How many officers are there in these three branches of the army? how many enlisted men? how many of both?

7. How many more enlisted men are there in the infantry than in the cavalry? than in the artillery?

8. Additional branches of the army, as engineers, scouts, hospital corps, etc., are not included in the table above. If the total strength of the army is 3856 officers and 60,385 enlisted men, how many officers belong to these branches? how many enlisted men?

FRACTIONS

188. 1. How many *whole* circles do you see? how many fourths of a circle over?

Write two; three fourths; two and three fourths.

2. A number that stands for one or more *whole* things is called a **whole number**, or an **integer**.

3. An integer and a fraction together are called a **mixed number**.

Add and subtract these mixed numbers:

4. $3\frac{1}{2}$ / $2\frac{1}{4}$

5. $7\frac{3}{4}$ / $4\frac{1}{2}$

6. $5\frac{5}{6}$ / $3\frac{1}{3}$

7. $8\frac{1}{2}$ / $5\frac{1}{6}$

8. $6\frac{2}{3}$ / $3\frac{1}{6}$

WRITTEN EXERCISES

189. 1. From $68\frac{1}{4}$ subtract $25\frac{3}{4}$.

$68\frac{1}{4}$
$25\frac{3}{4}$
$42\frac{1}{2}$

Can you subtract $\frac{3}{4}$ from $\frac{1}{4}$?

Then take 1 from the 8 to unite with $\frac{1}{4}$.

How many fourths are $1+\frac{1}{4}$, or $\frac{4}{4}+\frac{1}{4}$?

How many fourths are $\frac{5}{4}-\frac{3}{4}$? how many halves?

Write $\frac{1}{2}$ under the fractions.

How many units have been taken from the whole number? Then subtract 25 from 67 instead of from 68.

Read the entire answer. Tell how you found it.

Add and subtract:

2. $45\frac{1}{3}$ / $24\frac{2}{3}$

3. $88\frac{1}{2}$ / $43\frac{3}{4}$

4. $53\frac{1}{6}$ / $25\frac{5}{6}$

5. $75\frac{1}{3}$ / $38\frac{5}{6}$

6. $95\frac{1}{6}$ / $57\frac{1}{2}$

7. A tank contained $98\frac{1}{4}$ gallons of kerosene. How many gallons were left after $22\frac{1}{2}$ gallons had been sold?

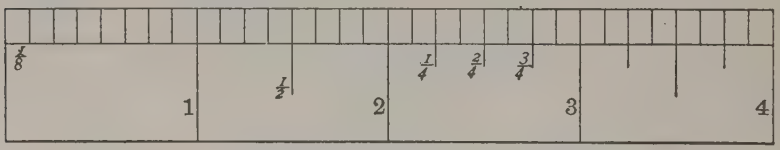
8. Ellen has saved $\$25\frac{1}{2}$, and her brother $\$15\frac{3}{4}$. How much more money has Ellen saved than her brother?

9. An ice house is $152\frac{2}{3}$ feet long and $56\frac{5}{6}$ feet wide. How much greater is its length than its width?

10. From a cheese weighing $30\frac{1}{2}$ pounds a grocer sold $6\frac{1}{2}$ pounds to one person and $3\frac{1}{4}$ pounds to another. How many pounds of the cheese were left?

190. Eighths and twelfths.

1. This rule is 4 inches long. Into how many equal parts is the first inch divided?



2. One of the *eight equal* parts of anything is called **one eighth** of it.

3. Look at the second inch and tell how many eighths are equal to $\frac{1}{2}$; to $\frac{2}{2}$.

4. Look at the third inch and tell how many eighths are equal to $\frac{1}{4}$; to $\frac{2}{4}$; to $\frac{3}{4}$; to $\frac{4}{4}$.

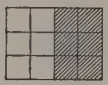
5. In the right-hand inch point to $\frac{1}{2}$ in.; $\frac{1}{4}$ in.; $\frac{1}{8}$ in.

6. Draw a rule 6 inches long and divide it into halves, fourths, and eighths of an inch. How many half inches will it contain? how many quarter inches? how many eighth inches?

7. Into how many equal parts is this oblong divided?

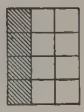
8. One of the *twelve equal* parts of anything is called **one twelfth** of it.

9. How many twelfths of this oblong are shaded? how many halves?



How many twelfths are equal to $\frac{1}{2}$?

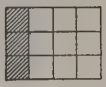
10. How many twelfths of this oblong are shaded? how many thirds?



How many twelfths are equal to $\frac{1}{3}$?

11. Look at the oblong again and tell how many twelfths are equal to $\frac{2}{3}$.

12. Look at this oblong and tell how many twelfths are equal to $\frac{1}{4}$; to $\frac{3}{4}$.



13. How many twelfths are equal to $\frac{1}{6}$? how many are equal to $\frac{5}{6}$?

14. How many inches are there in a foot? Then what part of a foot is 1 inch? How many twelfths of a foot are 2 inches? how many sixths of a foot?

15. What part of a foot are 3 in.? 4 in.? 5 in.? 6 in.?

WRITTEN EXERCISES

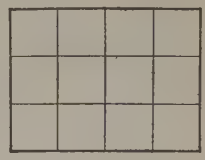
191. Draw lines and divide them to show that:

1.	$\frac{4}{8}=\frac{1}{2}$	5.	$\frac{2}{12}=\frac{1}{6}$	9.	$\frac{1}{2}=\frac{4}{8}$	13.	$\frac{8}{12}=\frac{2}{3}$
2.	$\frac{4}{12}=\frac{1}{3}$	6.	$\frac{1}{4}=\frac{3}{12}$	10.	$\frac{10}{12}=\frac{5}{6}$	14.	$\frac{6}{8}=\frac{3}{4}$
3.	$\frac{1}{4}=\frac{2}{8}$	7.	$\frac{1}{2}=\frac{6}{12}$	11.	$\frac{3}{4}=\frac{6}{8}$	15.	$\frac{3}{4}=\frac{9}{12}$
4.	$\frac{3}{12}=\frac{1}{4}$	8.	$\frac{1}{3}=\frac{4}{12}$	12.	$\frac{9}{12}=\frac{3}{4}$	16.	$\frac{5}{6}=\frac{10}{12}$

192. Comparing fractions.

1. Into how many equal squares is this oblong divided? How many squares are there in $\frac{1}{3}$ of it? in $\frac{1}{4}$ of it?

Which is greater, $\frac{1}{3}$ of the oblong or $\frac{1}{4}$ of it? how many squares greater? how many twelfths of the oblong greater?



2. How many squares are there in $\frac{1}{2}$ of the oblong? in $\frac{1}{3}$ of it?

Which is less, $\frac{1}{2}$ of the oblong or $\frac{1}{3}$ of it? how many squares less? how many twelfths less? how many sixths?

3. Which is greater, $\frac{1}{3}$ of the oblong or $\frac{1}{6}$ of it? what part of the oblong greater?

4. Looking at the oblong compare $\frac{1}{2}$ and $\frac{1}{3}$; $\frac{1}{3}$ and $\frac{3}{4}$.

WRITTEN EXERCISES

193. Draw an oblong 1 inch long and $\frac{1}{2}$ inch wide, and divide it into squares $\frac{1}{4}$ inch on a side.

Looking at your oblong, compare:

1. $\frac{1}{2}$ and $\frac{1}{8}$ 2. $\frac{1}{4}$ and $\frac{1}{8}$ 3. $\frac{1}{2}$ and $\frac{5}{8}$ 4. $\frac{3}{4}$ and $\frac{7}{8}$

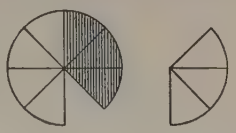
Draw oblongs or lines, and dividing them into parts, compare:

5. $\frac{1}{2}$ and $\frac{1}{6}$
6. $\frac{1}{2}$ and $\frac{3}{8}$
7. $\frac{1}{2}$ and $\frac{5}{6}$
8. $\frac{1}{2}$ and $\frac{3}{4}$
9. $\frac{1}{3}$ and $\frac{1}{12}$
10. $\frac{1}{4}$ and $\frac{1}{12}$
11. $\frac{2}{3}$ and $\frac{7}{12}$
12. $\frac{3}{4}$ and $\frac{5}{12}$
13. $\frac{2}{3}$ and $\frac{3}{4}$
14. $\frac{5}{6}$ and $\frac{2}{3}$
15. $\frac{3}{8}$ and $\frac{3}{4}$
16. $\frac{5}{6}$ and $\frac{5}{12}$

194. Adding and subtracting eighths.

1. How many eighths are $\frac{7}{8} + \frac{3}{8}$? how many ones and how many eighths over? how many ones and how many fourths over?

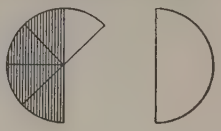
How many eighths are $\frac{7}{8} - \frac{3}{8}$? how many halves?



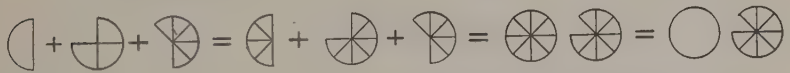
$\frac{7}{8} + \frac{3}{8} = ?$ $\frac{7}{8} - \frac{3}{8} = ?$ $\frac{5}{8} + \frac{1}{8} = ?$ $\frac{5}{8} - \frac{1}{8} = ?$

2. Is it possible to add $\frac{5}{8}$ and $\frac{1}{2}$ without changing either of the fractions? How many eighths are there in $\frac{1}{2}$? Then, how many eighths are $\frac{5}{8} + \frac{1}{2}$, or $\frac{5}{8} + \frac{4}{8}$? how many ones and how many eighths over?

How many eighths are $\frac{5}{8} - \frac{1}{2}$, or $\frac{5}{8} - \frac{4}{8}$?



3. Find the sum:



$\frac{1}{2} + \frac{3}{4} + \frac{5}{8} = \frac{4}{8} + \frac{6}{8} + \frac{5}{8} = ____ = ____$

EXERCISES

195. Do as the signs indicate, giving results promptly:

1. $\frac{1}{8} + \frac{1}{8}$	5. $\frac{3}{8} - \frac{1}{8}$	9. $\frac{1}{8} + \frac{1}{4}$	13. $\frac{7}{8} - \frac{5}{8}$
2. $\frac{5}{8} - \frac{5}{8}$	6. $\frac{1}{4} + \frac{3}{8}$	10. $\frac{5}{8} + \frac{7}{8}$	14. $\frac{1}{4} + \frac{5}{8}$
3. $\frac{3}{8} + \frac{1}{2}$	7. $\frac{7}{8} + \frac{1}{8}$	11. $\frac{3}{4} - \frac{3}{8}$	15. $\frac{1}{2} + \frac{7}{8}$
4. $\frac{1}{4} - \frac{1}{8}$	8. $\frac{1}{2} - \frac{3}{8}$	12. $\frac{7}{8} - \frac{1}{2}$	16. $\frac{5}{8} - \frac{1}{4}$

Add and subtract:

17. $4\frac{3}{8}$	18. $6\frac{7}{8}$	19. $8\frac{5}{8}$	20. $5\frac{1}{2}$	21. $9\frac{7}{8}$
$2\frac{3}{8}$	$1\frac{1}{4}$	$5\frac{3}{8}$	$3\frac{1}{8}$	$6\frac{7}{8}$

22. $\frac{1}{4} + \frac{5}{8} + \frac{3}{4} = ?$ **24.** $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} = ?$ **26.** $\frac{3}{4} + \frac{1}{2} + \frac{3}{8} = ?$

23. $\frac{7}{8} - \frac{3}{4} + \frac{3}{8} = ?$ **25.** $\frac{5}{8} + \frac{1}{2} - \frac{3}{4} = ?$ **27.** $\frac{7}{8} + \frac{1}{4} - \frac{1}{2} = ?$

28. Some children ate $\frac{5}{8}$ of a watermelon. What part of the melon was not eaten?

29. Earl caught two trout, one weighing $\frac{1}{4}$ lb. and the other $\frac{3}{8}$ lb. How much did both weigh?

30. When Eleanor had used $3\frac{3}{8}$ lb. of butter from $8\frac{1}{2}$ lb. that she bought, how many pounds were left?

31. A druggist made $2\frac{1}{2}$ gal. of strawberry sirup and $\frac{1}{4}$ gal. less of pineapple sirup. How much sirup did he make?

WRITTEN EXERCISES

196. **1.** From $62\frac{1}{4}$ subtract $38\frac{7}{8}$.

$$62\tfrac{1}{4} = 62\tfrac{2}{8} = 61\tfrac{10}{8}$$
$$\underline{38\tfrac{7}{8} = 38\tfrac{7}{8} = 38\tfrac{7}{8}}$$
$$23\tfrac{3}{8}$$

Add and subtract:

2. $47\frac{1}{8}$	**3.** $68\frac{1}{4}$	**4.** $36\frac{5}{8}$	**5.** $75\frac{1}{2}$	**6.** $41\frac{1}{8}$
$\underline{24\frac{1}{2}}$	$\underline{42\frac{3}{8}}$	$\underline{19\frac{3}{4}}$	$\underline{38\frac{7}{8}}$	$\underline{21\frac{1}{4}}$
7. $56\frac{1}{4}$	**8.** $84\frac{1}{8}$	**9.** $65\frac{3}{8}$	**10.** $90\frac{3}{8}$	**11.** $72\frac{3}{4}$
$\underline{29\frac{5}{8}}$	$\underline{37\frac{3}{4}}$	$\underline{28\frac{1}{2}}$	$\underline{34\frac{3}{4}}$	$\underline{46\frac{7}{8}}$

12. John weighs $71\frac{1}{2}$ lb. and Edward $64\frac{5}{8}$ lb. When both ride on their pony, what weight does the pony carry?

13. Edward drew on his cart $24\frac{1}{2}$ lb. flour, 16 lb. sugar, $\frac{1}{4}$ lb. mustard, and $\frac{3}{8}$ lb. ginger. How much did the load weigh?

197. Adding and subtracting twelfths.

EXERCISES

1. Find the sum and the difference of $\frac{11}{12}$ and $\frac{5}{12}$.

SOLUTIONS. $\frac{11}{12} + \frac{5}{12} = \frac{16}{12} = 1\frac{4}{12} = 1\frac{1}{3}$, the sum.

$\frac{11}{12} - \frac{5}{12} = \frac{6}{12} = \frac{1}{2}$, the difference.

2. Find the sum and the difference of $\frac{7}{12}$ and $\frac{1}{3}$.

SOLUTIONS. $\frac{7}{12} + \frac{1}{3} = \frac{7}{12} + \frac{4}{12} = \frac{11}{12}$, the sum.

$\frac{7}{12} - \frac{1}{3} = \frac{7}{12} - \frac{4}{12} = \frac{3}{12} = \frac{1}{4}$, the difference.

Find the sum and the difference of:

3. $\frac{1}{2}$ and $\frac{1}{12}$
4. $\frac{1}{4}$ and $\frac{1}{12}$
5. $\frac{2}{3}$ and $\frac{1}{12}$
6. $\frac{3}{4}$ and $\frac{5}{12}$
7. $\frac{5}{12}$ and $\frac{1}{2}$
8. $\frac{7}{12}$ and $\frac{1}{6}$
9. $\frac{5}{12}$ and $\frac{1}{3}$
10. $\frac{11}{12}$ and $\frac{5}{6}$
11. $\frac{3}{4}$ and $\frac{7}{12}$
12. $\frac{5}{6}$ and $\frac{5}{12}$
13. $\frac{11}{12}$ and $\frac{2}{3}$
14. $1\frac{1}{2}$ and $\frac{11}{12}$

WRITTEN EXERCISES

198. Add and subtract:

1.	2.	3.	4.	5.
$45\frac{11}{12}$	$54\frac{3}{4}$	$48\frac{1}{12}$	$33\frac{5}{12}$	$64\frac{1}{3}$
$31\frac{1}{2}$	$27\frac{1}{12}$	$25\frac{7}{12}$	$11\frac{1}{2}$	$32\frac{11}{12}$
6.	**7.**	**8.**	**9.**	**10.**
$87\frac{1}{4}$	$93\frac{5}{12}$	$75\frac{11}{12}$	$68\frac{1}{6}$	$81\frac{1}{12}$
$52\frac{7}{12}$	$65\frac{2}{3}$	$36\frac{3}{4}$	$29\frac{11}{12}$	$45\frac{5}{6}$

Do as the signs indicate:

11. $\frac{5}{12} + \frac{7}{12} + \frac{3}{4}$
12. $\frac{2}{3} - \frac{7}{12} + \frac{1}{2}$
13. $\frac{5}{6} + \frac{5}{12} - \frac{3}{4}$

14. Helen's height is $4\frac{5}{12}$ ft. and her mother's is $5\frac{1}{2}$ ft. How much taller is Helen's mother than Helen?

15. Fred rowed down the river for $2\frac{3}{4}$ hr., and it took him $3\frac{7}{12}$ hr. to row back. How long was he gone?

16. Richard could jump $3\frac{11}{12}$ ft., but by running he could jump $6\frac{1}{3}$ ft. How much farther could he jump by running?

199. Adding and subtracting halves and thirds.

1. Can you add the fractions $\frac{1}{2}$ and $\frac{1}{3}$ as they stand? Can you subtract one from the other?

2. How many sixths are there in $\frac{1}{2}$? in $\frac{1}{3}$?

3. Add $\frac{3}{6}$ and $\frac{2}{6}$. Subtract $\frac{2}{6}$ from $\frac{3}{6}$.

4. What must be done to *different kinds* of fractions before they can be added or subtracted?

5. $\frac{1}{2}+\frac{1}{3}=\frac{3}{6}+\frac{2}{6}=$? 6. $\frac{1}{2}-\frac{1}{3}=$ —— $-$ —— $=$?

EXERCISES

200. Do as the signs indicate:

1. $\frac{1}{3}+\frac{1}{2}$
2. $\frac{1}{2}+\frac{2}{3}$
3. $\frac{1}{2}-\frac{1}{3}$
4. $\frac{2}{3}-\frac{1}{2}$
5. $1\frac{1}{3}-\frac{1}{2}$
6. $1\frac{1}{2}-\frac{2}{3}$

Add and subtract:

7. $15\frac{2}{3}$ / $8\frac{1}{2}$
8. $10\frac{1}{2}$ / $6\frac{1}{3}$
9. $17\frac{1}{3}$ / $5\frac{1}{2}$
10. $14\frac{1}{2}$ / $11\frac{2}{3}$
11. $16\frac{1}{3}$ / $9\frac{1}{2}$

12. How many hours are $11\frac{1}{2}$ hours and $3\frac{1}{3}$ hours?

13. What is the sum of $5\frac{2}{3}$ years and $7\frac{1}{2}$ years?

14. Find the difference between $6\frac{1}{2}$ yards and $4\frac{2}{3}$ yards.

201. Adding and subtracting thirds and fourths.

WRITTEN EXERCISES

1. Find the sum of $\frac{1}{3}$ and $\frac{1}{4}$.

SOLUTION. $\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$.

2. Subtract $\frac{2}{3}$ from $\frac{3}{4}$.

SOLUTION. $\frac{3}{4} - \frac{2}{3} = \frac{9}{12} - \frac{8}{12} = \frac{1}{12}$.

Find answers:

3. $\frac{3}{4} + \frac{1}{3}$
4. $\frac{2}{3} - \frac{1}{4}$
5. $\frac{3}{4} - \frac{1}{3}$
6. $\frac{2}{3} + \frac{3}{4}$
7. $\frac{1}{4} + \frac{2}{3}$
8. $\frac{1}{3} - \frac{1}{4}$
9. $1\frac{1}{4} - \frac{1}{3}$
10. $1\frac{1}{3} - \frac{3}{4}$

11. $23\frac{1}{4} + 42\frac{1}{3}$
12. $54\frac{3}{4} - 19\frac{1}{3}$
13. $76\frac{1}{3} - 38\frac{1}{4}$
14. $27\frac{1}{4} + 46\frac{2}{3}$
15. $63\frac{1}{3} - 24\frac{3}{4}$
16. $82\frac{1}{4} - 56\frac{2}{3}$
17. $38\frac{1}{3} + 45\frac{3}{4}$
18. $14\frac{3}{4} + 83\frac{2}{3}$
19. $66\frac{2}{3} - 29\frac{1}{4}$
20. $98\frac{2}{3} - 57\frac{3}{4}$

Find the missing numbers:

21. $38\frac{1}{4} + \underline{\quad} = 62\frac{1}{3}$
22. $24\frac{2}{3} + \underline{\quad} = 73\frac{3}{4}$
23. $52\frac{2}{3} + \underline{\quad} = 81\frac{1}{4}$
24. $36\frac{3}{4} + \underline{\quad} = 94\frac{1}{3}$
25. $41\frac{3}{4} + \underline{\quad} = 78\frac{2}{3}$

26. If it takes $3\frac{1}{3}$ hr. to drive to Schuyler Falls and $\frac{3}{4}$ hr. to go by train, how much time does it save to go by train?

27. It takes $14\frac{3}{4}$ yd. of carpet for our hall and $10\frac{2}{3}$ yd. for the stairs. How many yards are needed for both?

28. A bunch of bananas contained $10\frac{2}{3}$ dozen. How many dozen were left after $6\frac{1}{4}$ dozen had been sold?

202. Finding parts of numbers.

EXERCISES

1. Find $\frac{1}{2}$ of 12; $\frac{1}{3}$ of 15; $\frac{2}{3}$ of 15; $\frac{1}{4}$ of 20; $\frac{3}{4}$ of 20; $\frac{1}{5}$ of 25; $\frac{3}{5}$ of 25.

2. How many are $\frac{1}{3}$ of 18? $\frac{2}{3}$ of 18? $\frac{1}{5}$ of 30? $\frac{2}{5}$ of 30? $\frac{4}{5}$ of 30? $\frac{1}{6}$ of 36? $\frac{5}{6}$ of 36?

3. Find $\frac{1}{4}$ of 40; $\frac{3}{4}$ of 40; $\frac{1}{6}$ of 48; $\frac{5}{6}$ of 48; $\frac{1}{8}$ of 56; $\frac{3}{8}$ of 56; $\frac{5}{8}$ of 64; $\frac{7}{8}$ of 80.

Find:

4. $\frac{1}{2}$ of 30	9. $\frac{1}{8}$ of 72	14. $\frac{3}{4}$ of 28	19. $\frac{3}{5}$ of 45
5. $\frac{1}{3}$ of 90	10. $\frac{1}{2}$ of 46	15. $\frac{4}{5}$ of 35	20. $\frac{3}{4}$ of 36
6. $\frac{1}{4}$ of 80	11. $\frac{1}{3}$ of 39	16. $\frac{5}{8}$ of 40	21. $\frac{5}{6}$ of 54
7. $\frac{1}{5}$ of 55	12. $\frac{1}{4}$ of 88	17. $\frac{5}{6}$ of 60	22. $\frac{3}{8}$ of 64
8. $\frac{1}{6}$ of 42	13. $\frac{2}{3}$ of 24	18. $\frac{3}{8}$ of 48	23. $\frac{7}{8}$ of 32

24. How many minutes are there in $\frac{1}{2}$ of an hour? in $\frac{1}{3}$ of an hour?

25. If you breathe 18 times in a minute, how many times do you breathe in $\frac{2}{3}$ of a minute?

26. Of the 36 boys in the third grade last year $\frac{3}{4}$ were promoted. How many were promoted? How many were not promoted?

27. A hen had 12 chickens. If $\frac{5}{6}$ of them were yellow and the rest black, how many were there of each color?

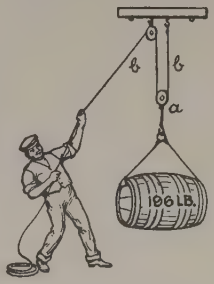
28. Kenneth had 45¢, and he paid $\frac{3}{5}$ of it for a purse. How much did he pay? How much did he have left?

WRITTEN EXERCISES

203. Find:

1. $\frac{1}{6}$ of 336
2. $\frac{2}{3}$ of 423
3. $\frac{1}{8}$ of 648
4. $\frac{3}{4}$ of 512
5. $\frac{3}{8}$ of 408
6. $\frac{5}{6}$ of 744
7. $\frac{7}{8}$ of 872
8. $\frac{5}{8}$ of 968
9. $\frac{5}{8}$ of 1264
10. $\frac{3}{8}$ of 3656
11. $\frac{5}{6}$ of 5472
12. $\frac{7}{8}$ of 8688

13. Since each part of rope *b* sustains $\frac{1}{2}$ the weight of the barrel, the man must pull only $\frac{1}{2}$ its weight to raise it. How many pounds must he pull to raise the barrel of flour, which weighs 196 lb.?



14. When a pound of tea is worth 60¢, how much will $\frac{3}{4}$ lb. cost?

15. I bought a horse for \$176 and sold him for $\frac{7}{8}$ of the cost. How much did I get for him? How much did I lose?

16. James had \$1.75, and he paid $\frac{4}{5}$ of it for a hat. How much did the hat cost?

17. Andrew and Oliver bought a box containing 144 screws. Andrew used $\frac{3}{8}$ of them and Oliver $\frac{1}{4}$ of them. How many screws were left in the box?

18. Pauline bought 2 packages of gilt tacks, 100 in each package. She used $\frac{7}{8}$ of them. How many did she use? How many were left?

19. Mark had \$2.25. He spent $\frac{2}{5}$ of his money for a pair of skates and $\frac{1}{5}$ of it for straps. How much money did he spend? What part of the \$2.25 had he left?

204. Multiplying by a mixed number.

1. How many cents are 4 times 6 cents? $\frac{1}{2}$ of 6 cents? the sum of $4 \times 6¢$ and $\frac{1}{2}$ of $6¢$?

Then how many cents are $4\frac{1}{2} \times 6¢$?

You have multiplied $6¢$ by $4\frac{1}{2}$, by multiplying $6¢$ by 4, finding $\frac{1}{2}$ of $6¢$, and adding the results.

2. In a similar way multiply 8 in. by $2\frac{1}{2}$; 4 doz. by $3\frac{1}{4}$; 5 gal. by $6\frac{1}{5}$.

3. Find $7\frac{1}{5}$ times 10 min.; $4\frac{1}{3} \times 6$ hr.; $5\frac{1}{8} \times 8$ yd.

EXERCISES

205. 1. How many dollars are $5\frac{1}{3} \times \$9$?

SOLUTION. — $5\frac{1}{3} \times \$9$ means the sum of $5 \times \$9$ and $\frac{1}{3}$ of $\$9$. $5 \times \$9 = \$45$, and $\frac{1}{3}$ of $\$9 = \$3$; then $5\frac{1}{3} \times \$9 = \$45 + \$3 = \$48$.

Find:	Find:	Multiply:
2. $3\frac{1}{2} \times 4$ ft.	6. $2\frac{1}{6} \times 12$ qt.	10. \$30 by $3\frac{1}{3}$.
3. $2\frac{1}{3} \times 6$ mo.	7. $1\frac{1}{8} \times 16$ yd.	11. 20 hr. by $4\frac{1}{4}$.
4. $5\frac{1}{4} \times 8$ gal.	8. $7\frac{1}{5} \times 10$ pt.	12. $40¢$ by $2\frac{1}{8}$.
5. $3\frac{1}{3} \times 9$ min.	9. $1\frac{1}{4} \times 24$ min.	13. 60 min. by $1\frac{1}{2}$.

14. How many quarts are there in $4\frac{1}{2}$ gallons?

15. Find the cost of $5\frac{1}{4}$ yards of ribbon at 8 cents a yard.

16. How many ounces are there in $1\frac{1}{4}$ pounds?

17. I buy pens at $8¢$ a dozen and sell them at $1¢$ each. How much do I gain on 1 doz.? on $1\frac{1}{2}$ doz.? on $5\frac{1}{4}$ doz.?

18. How many feet are there in $8\frac{1}{3}$ yards?

19. There are 8 pints in 1 gallon. How many pints are there in $3\frac{1}{2}$ gallons? in $7\frac{1}{4}$ gallons? in $9\frac{1}{8}$ gallons?

20. How much will $4\frac{1}{2}$ pounds of nuts cost at 20 cents a pound?

21. At 32 cents a pound, how much will $1\frac{1}{8}$ pounds of butter cost?

22. Find the cost of $2\frac{1}{6}$ dozen bananas at 12 cents a dozen.

WRITTEN EXERCISES

206. 1. Multiply 376 by $7\frac{3}{4}$.

$$\begin{array}{r} 376 \\ 7\frac{3}{4} \\ \hline \end{array}$$

376 multiplied by $\frac{3}{4} = 282$
376 multiplied by $7 = 2632$
376 multiplied by $7\frac{3}{4} = 2914$

Multiply:

2. 48 by $5\frac{2}{3}$
3. 65 by $8\frac{2}{5}$
4. 72 by $6\frac{3}{8}$
5. 284 by $9\frac{3}{4}$
6. 195 by $7\frac{4}{5}$
7. 464 by $8\frac{5}{8}$
8. 735 by $24\frac{3}{5}$
9. 896 by $72\frac{7}{8}$
10. 942 by $89\frac{5}{6}$

Find the cost of:

11. $7\frac{3}{4}$ yards of cloth @ \$.72.
12. $8\frac{2}{3}$ yards of carpet @ \$1.08.
13. $12\frac{3}{4}$ dozen window pulleys @ \$.40.
14. $15\frac{3}{8}$ gallons of molasses @ \$.24.
15. $25\frac{5}{6}$ dozen ears of green corn @ \$.18.
16. $11\frac{2}{3}$ dozen eggs for hatching @ \$.90.

17. A few days before Thanksgiving Day our grocer bought turkeys, weighing in all $72\frac{1}{4}$ pounds, at \$.16 per pound. How much money did he invest in turkeys?

18. We bought a turkey of him at \$.20 a pound. It weighed 10 pounds when he bought it and $9\frac{3}{4}$ pounds when he sold it to us. How much did he gain?

19. He bought a bag of mixed nuts containing $96\frac{1}{2}$ pounds, for which he paid \$.12 a pound. He sold them at \$.18 a pound. How much did he gain?

How much did we have to pay for $2\frac{1}{2}$ pounds?

207. Finding the whole when one part is given.

1. A pie is cut into 4 equal pieces worth 5 cents each. How much is the whole pie worth?

If $\frac{1}{4}$ of the cost of a pie is 5 cents, what is the *whole* cost?

2. If $\frac{1}{5}$ of the cost of a baseball bat was 9 cents, how much did the bat cost?

3. If $\frac{1}{3}$ of a number is 4, what is the number?

EXERCISES

208. Find the cost of:

1. A pint of cream, when $\frac{1}{2}$ pt. costs 10¢.
2. A pound of coffee, when $\frac{1}{4}$ lb. costs 9¢.
3. A dozen bananas, when $\frac{1}{6}$ doz. costs 3¢.
4. A pound of tea, when $\frac{1}{8}$ lb. costs 8¢.
5. A pound of cocoa, when $\frac{1}{4}$ lb. costs 11¢.
6. A yard of velvet, when $\frac{1}{8}$ yd. costs 12¢.

7. If $\frac{1}{2}$ of a cake costs 20 cents, how much will the whole cake cost?

8. If $\frac{1}{4}$ of a pound of macaroons costs 10 cents, how much must be paid for a pound?

9. Julia bought half a pound of candy for 30 cents. How much did she pay for the candy per pound?

WRITTEN EXERCISES

209. 1. A bookcase was sold at auction for \$128, which was only half of its value. How much was it worth?

2. I sent out 16 Christmas cards, which was $\frac{1}{5}$ of the number I had bought. How many cards did I buy?

3. If $\frac{1}{4}$ of a yard of flannel costs 15 cents, how much does the flannel cost per yard?

4. Mr. Sage owns $\frac{1}{3}$ of a store. He values his share at \$850. How much does he think the store is worth?

5. Some boys bought a football. James paid \$.35 toward it, and this was $\frac{1}{8}$ of the cost. Find the cost.

6. A man bought a lot and paid $\frac{1}{4}$ of the cost in cash. He paid \$225 cash. Find the cost of the lot.

7. A house rented for \$375 a year, or for $\frac{1}{8}$ of its value. What was the value of the house?

8. If $\frac{1}{6}$ of the inhabitants of a city vote, and the voters number 8200, what is the population of the city?

9. An excursion ticket to Chicago cost 50 cents, or 5 cents less than half of the regular fare. What was the regular fare?

NUMBERS TO ONE HUNDRED FORTY-FOUR

210. Counting by elevens.

1. Multiply, then give the table of 11's to 9 times 11:

11	11	11	11	11	11	11	11	11
1	2	3	4	5	6	7	8	9

2. How is a number multiplied by 10? How many, then, are ten times 11 ?

3. How many are ten 11's and one 11, or 11 times 11?

$$\begin{array}{r} 110 \\ +11 \\ \hline \end{array}$$

4. How many are ten 11's and two 11's, or 12 times 11 ?

$$\begin{array}{r} 110 \\ +22 \\ \hline \end{array}$$

5. Give the table of 11's to 12 times 11.

6. Memorize:

$1 \times 11 = 11$	$7 \times 11 = 77$
$2 \times 11 = 22$	$8 \times 11 = 88$
$3 \times 11 = 33$	$9 \times 11 = 99$
$4 \times 11 = 44$	$10 \times 11 = 110$
$5 \times 11 = 55$	$11 \times 11 = 121$
$6 \times 11 = 66$	$12 \times 11 = 132$

7. How many 11's are there in 22? in 33? in 44? in 55? in 66?

$77 \div 11 = ?$ $121 \div 11 = ?$

$99 \div 11 = ?$ $110 \div 11 = ?$

$88 \div 11 = ?$ $132 \div 11 = ?$

8. Compare 11 times 10 with 10 times 11.

9. Tell the number of 11's in the sum, then the sum:

11	11	11	11	11	44	44	44
11	11	11	44	66	22	33	66
11	22	33	11	11	33	55	11

10. Find $\frac{1}{2}$ of 22; $\frac{1}{3}$ of 33; $\frac{1}{6}$ of 66. 11 is $\frac{1}{4}$ of what number? $\frac{1}{8}$ of what number?

211. Counting by twelves.

1. Tell the number of 12's in the sum, then the sum:

12	24	36	48	60	60	60	60	60
12	12	12	12	12	24	36	48	60

2. Multiply, then give the table of 12's to 10 times 12:

12	12	12	12	12	12	12	12	12
2	3	4	5	6	7	8	9	10

3. How many eggs are 2 dozen eggs? 3 doz.? 4 doz.? 5 doz.? 6 doz.? 7 doz.? 8 doz.?

5. How many pens are 9 dozen pens? 10 doz.? 11 doz.? 12 doz.?

4. Memorize:

$1 \times 12 = 12$	$7 \times 12 = 84$
$2 \times 12 = 24$	$8 \times 12 = 96$
$3 \times 12 = 36$	$9 \times 12 = 108$
$4 \times 12 = 48$	$10 \times 12 = 120$
$5 \times 12 = 60$	$11 \times 12 = 132$
$6 \times 12 = 72$	$12 \times 12 = 144$

12 dozen = 144 = 1 gross.

6. Compare 12 times 10 with 10 times 12.

7. Compare 12 times 11 with 11 times 12.

8. How many 12's are there in 24? in 36? in 48? in 60? in 72? in 84? in 96?

$108 \div 12 = ?$ $120 \div 12 = ?$ $132 \div 12 = ?$ $144 \div 12 = ?$

9. Tell the number of 12's in the sum, then the sum:

120	108	72	120	108	72	84	96
12	24	60	24	36	72	60	48

EXERCISES

212. 1. How many squares are 12 times 2 squares? How many squares are 2 times 12 squares?

2. Compare 12 times 2 with 2 times 12. What is the product of 2 and 12?

3. Draw an oblong 11 inches long and 3 inches wide; divide it into inch squares. Count the squares by 11's; by 3's. Find in two ways the product of 11 and 3.

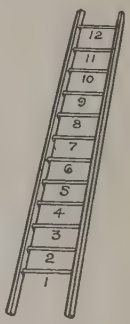
Find in two ways the product of:

4. 12 and 5
5. 12 and 4
6. 7 and 11
7. 6 and 12
8. 11 and 8
9. 10 and 12

10. Since 4 times 11 = 44, 11 times 4 = ——. Find 12 times 4.

11. Give the table of 4's to 12 times 4.

Drill on this table, giving the multiples of 4, first in regular order up and down the ladder, next in various orders, pointing to different rungs of the ladder.



12. In the same way extend the table of 5's to 12 times 5, and drill on the table.

Give these tables and drill on each:

13. The 6's to 12 times 6.
14. The 7's to 12 times 7.
15. The 8's to 12 times 8.
16. The 9's to 12 times 9.
17. Give the table of 10's to 12 times 10.

Answer quickly, thus: looking at 32 say "4 times 8."

18. Multiples of 8.		19. Multiples of 12.		20. Multiples of 9.	
32	80	24	108	36	27
48	40	48	120	54	45
64	88	96	72	72	90
24	96	36	144	108	81

21. Multiples of 6.		22. Multiples of 7.		23. Multiples of 11.	
36	24	14	28	11	77
72	48	35	42	55	121
18	30	70	84	110	44
54	66	63	77	132	99

24. Write all the multiplication tables to 12 times 12, thus:

$1 \times 1 = 1$	$1 \times 2 = 2$	$1 \times 3 =$	$1 \times 4 =$	and so on.
$2 \times 1 = 2$	$2 \times 2 = 4$	$2 \times 3 =$	$2 \times 4 =$	
etc.	etc.	etc.	etc.	

25. $\frac{1}{3}$ of $36 = ?$	30. $\frac{2}{3}$ of $33 = ?$	35. $\frac{5}{8}$ of $96 = ?$
26. $\frac{1}{4}$ of $44 = ?$	31. $\frac{4}{5}$ of $60 = ?$	36. $\frac{3}{4}$ of $48 = ?$
27. $\frac{1}{5}$ of $60 = ?$	32. $\frac{3}{8}$ of $88 = ?$	37. $\frac{4}{5}$ of $55 = ?$
28. $\frac{1}{6}$ of $66 = ?$	33. $\frac{5}{6}$ of $72 = ?$	38. $\frac{5}{6}$ of $66 = ?$
29. $\frac{1}{8}$ of $96 = ?$	34. $\frac{2}{5}$ of $55 = ?$	39. $\frac{7}{8}$ of $96 = ?$

Give quotients, and remainders if there are any:

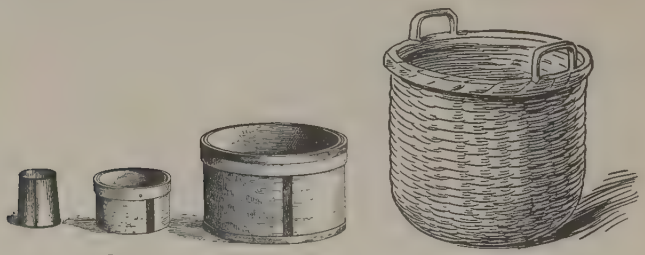
40. $4\overline{)50}$	44. $8\overline{)90}$	48. $8\overline{)75}$	52. $11\overline{)100}$
41. $5\overline{)60}$	45. $9\overline{)100}$	49. $9\overline{)75}$	53. $12\overline{)100}$
42. $6\overline{)70}$	46. $8\overline{)100}$	50. $12\overline{)75}$	54. $11\overline{)120}$
43. $7\overline{)80}$	47. $7\overline{)75}$	51. $12\overline{)125}$	55. $12\overline{)120}$

MEASURING

213. Measuring dry and bulky articles.

1. What measures are used to measure milk? oil? Are the same measures used to measure oats? potatoes?

2. Dry and bulky articles, as grain, vegetables, berries, etc., are measured by these measures. Name them.



PINT QUART PECK BUSHEL

3. Take a pint measure such as is used to measure peanuts or cranberries. Fill it with grain (or sand) and empty it into the quart measure.

Do this again. Is the quart measure full now?

How many pints of grain equal a quart of grain?

4. How many pints of nuts equal a quart of nuts?

5. A quart of cranberries = —— pints of cranberries.

2 pints equal 1 quart.

6. Fill the quart measure with grain and empty it into the peck measure.

Continue to *measure by quarts* until you find how many quarts equal a peck.

7. How many quarts of peas equal a peck of peas?

8. A peck of beans = —— quarts of beans.

8 quarts equal 1 peck.

9. Measure by pecks and find how many pecks equal a bushel.

10. How many pecks of corn equal a bushel of corn?

11. Learn this table of **dry measures.**

2 pints (pt.)	**= 1 quart (qt.)**
8 quarts	**= 1 peck (pk.)**
4 pecks	**= 1 bushel (bu.)**

EXERCISES

214. 1. How many quarts are there in 2 pk.? in 3 pk.? in 1 bu.? in $\frac{1}{2}$ bu.? in $\frac{3}{4}$ bu.? in 2 bu.?

2. John's father bought $1\frac{1}{2}$ bushels of tomatoes. How many pecks of tomatoes did he buy? how many quarts?

3. How many quarts are there in $\frac{1}{2}$ pk.? in $\frac{1}{4}$ pk.? What part of a peck is 1 qt.? 2 qt.? 4 qt.? 6 qt.?

4. Mr. Davis bought a 2-bushel bag of oats for his horse. He gave the horse 4 quarts of oats at a feed. For how many feeds did the oats last?

5. How many quarts of strawberries or of peaches will a bushel crate hold?

6. Mrs. White bought 24 quarts of fruit. How many pecks of fruit did she buy? How much less than a bushel of fruit did she buy?

7. Lester picked 10 quarts of plums off his plum tree. How many pecks of plums did he pick?

8. Mary picked a 10-quart basket of cherries full 4 times. She picked 1 bu. and —— qt., or —— pk.

9. A potato barrel sometimes holds 10 pecks of potatoes. How many bushels does such a barrel hold?

10. If a pint of peanuts costs 5 cents, how much will a quart cost at that price? a peck?

11. How many bushels of corn meal are required to feed 32 cows, if 1 quart is given to each cow?

How many bushels of corn meal are required per day to feed 32 cows 2 quarts apiece, both morning and evening?

215. Measuring length or distance.

1. How many inches are there in a foot? in a yard? How many feet are there in a yard? in $\frac{1}{2}$ yard?

2. Which of these three measures should you use to measure the width of this book? the width of the street? the length of a piece of cloth?

3. Measure $5\frac{1}{2}$ yards along a board in the floor. This distance is called **one rod**.

4. Stand 1 rod from the door. Walk 1 rod.

5. How many feet are there in 5 yards? in $\frac{1}{2}$ yard? in $5\frac{1}{2}$ yards? in 1 rod?

$5\frac{1}{2}$ yards, or $16\frac{1}{2}$ feet, equal 1 rod.

6. What measures might be used to measure the length and width of a lot? of a pasture? the length of a fence?

7. Tell the distance between some two towns or cities near you; between the ends of some long street. What measure is used to measure long distances?

8. Mention a place about a mile from the schoolhouse.

9. In some cities 20 blocks make a mile. In such cities a block is 16 rods long. How many rods equal a mile?

10. In other cities 12 blocks equal a mile, and each block is 440 feet long. How many feet equal a mile?

11. Learn this table of **measures of length**:

12 inches (in.)	**= 1 foot (ft.)**
3 feet	**= 1 yard (yd.)**
$16\frac{1}{2}$ feet	**= 1 rod (rd.)**
320 rods	**= 1 mile (mi.)**

A mile is equal to 5280 feet.

WRITTEN EXERCISES

216. 1. How many yards are $5\frac{1}{2}$ yd. + $5\frac{1}{2}$ yd., or 2 rd.? How many feet are there in 11 yd., or in 2 rd.? in 4 rd.?

2. The bases of a baseball diamond are 90 feet apart. How many yards must a boy run to make a home run?

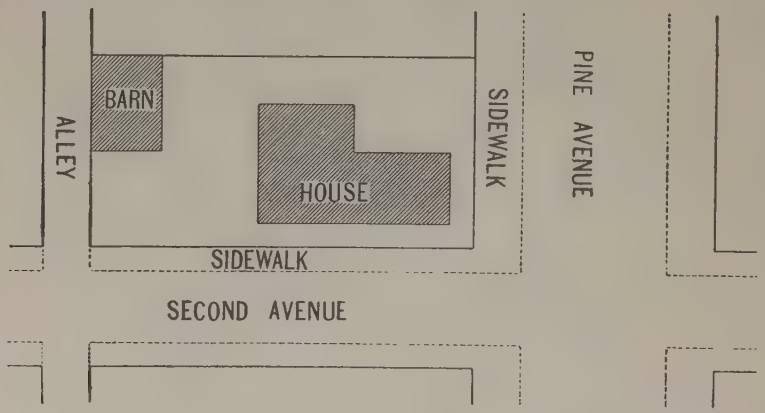
3. A football field is 110 yards long. Express the length in feet. Compare the length with that of a block in your city.

4. How many rods of fence are required to inclose a farm $\frac{1}{4}$ of a mile long and $\frac{1}{8}$ of a mile wide?

5. How many yards are there in a mile? in $\frac{1}{2}$ mile?

EXERCISES

217. 1. In this map, or plan, 1 inch represents 64 feet. If you measure the plan of the house, you will find that it is 1 inch long. Then the house is 64 feet long.



2. Since 1 inch represents 64 feet, what distance does $\frac{1}{8}$ in. represent? $\frac{1}{4}$ in.? $\frac{3}{8}$ in.? $\frac{5}{8}$ in.? 2 in.?

Using a rule divided to eighths of an inch, find:

3. Width of lot.
4. Length of lot.
5. Width of house.
6. Length of barn.
7. Width of barn.
8. Width of alley.
9. Width of Pine Ave.
10. Width of Second Ave.

11. How wide is each sidewalk on Pine Ave.? on Second Ave.? How wide is each street between the sidewalks?

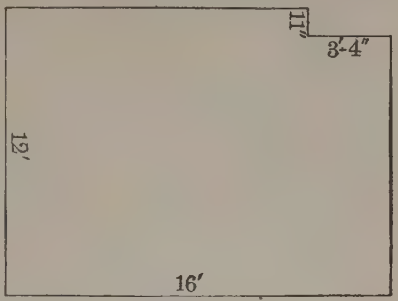
12. How far is the house from the front of the lot on Pine Ave.? from the side of the lot on Second Ave.? from the other side of the lot? from the back of the lot?

WRITTEN EXERCISES

218. 1. In drawings we do not write the words "feet" and " inches."

In this plan of the floor of a room, 16 feet is written 16′; 11 inches is written 11″; 3 feet 4 inches is written 3′–4″.

In the plan, 1 inch represents 8 feet, or the *scale* is 1″ = 8′, or "8 feet to the inch."



SCALE: 1″ = 8′

2. Draw the plan of a room 20 ft. by 16 ft., using 1 inch to represent 4 feet. Write 20′ and 16′ on the plan in the proper places, and write the scale below.

Draw the plan of each of the following:

3. A room, 21 ft. by 18 ft., scale 1 in. = 4 ft.

4. A garden plot 42 ft. by 37 ft., scale 1 in. = 8 ft.

5. A croquet ground, 30 yd. by 20 yd., scale 1 in. = 5 yd.

6. A tennis court, 78 ft. by 30 ft., scale 1 in. = 12 ft.

7. A hall, 30 ft. by 8 ft., paved with tiles 2 ft. square, scale 1 in. = 4 ft. Show the tiles in the plan.

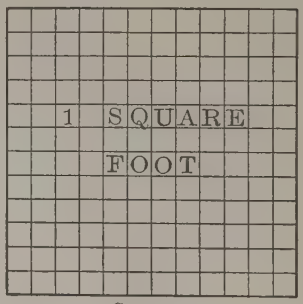
8. A celery patch, 75 ft. by 27 ft., with 9 rows of celery 3 ft. apart, scale 1 in. = 8 ft. Show rows by dotted lines.

9. An orchard, 40 rd. by 25 rd., scale 1 in. = 8 rd. Divide the ground into squares 2 rd. on a side, and show a tree in the middle of each square, thus: ⊕

219. Measuring area.

1. How long is each side of an inch square? of a foot square? Can a foot square be drawn on this page?

2. In this picture of a square foot divided into square inches, the scale is $1'' = 8''$. The square is drawn *one eighth size.*



SCALE $\frac{1}{8}$

On the blackboard draw a square foot divided into square inches, *full size.*

Draw another one, on paper, *one half size.* Draw another one, *one fourth size.*

3. Since there are 12 inches in a foot, how many square inches are there in each row? in 2 rows? in 3 rows? in 12 rows, or in 1 square foot?

144 square inches equal 1 square foot.

4. Draw full size on the blackboard a yard square divided into foot squares. Draw the same one half size; one fourth size.

5. This is a yard square drawn to a still smaller scale. Measure, and find the scale. Express the scale in the form, scale: $1'' = \text{——}$.

6. How many square feet are there in a square yard?

7. Learn this table of **measures of area:**

144 square inches (sq. in.)	= 1 square foot (sq. ft.)
9 square feet	= 1 square yard (sq. yd.)

WRITTEN EXERCISES

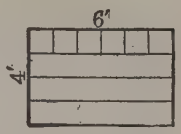
220. 1. Find the area of an oblong 6 ft. by 4 ft.

MODEL SOLUTION

In 1 row there are 6 sq. ft.

In 4 rows there are 4×6 sq. ft., or 24 sq. ft.

Area = 24 sq. ft.



SCALE: 1" = 8'

Draw, and find, as above, the area of:

2. An oblong, 8 in. by 10 in., scale $\frac{1}{2}$.
3. An oblong, 9 in. by 7 in., scale $\frac{1}{4}$.
4. A square, 7 ft. by 7 ft., scale 1 in. = 8 ft.
5. An oblong, 18 yd. by 9 yd., scale 1 in. = 4 yd.
6. A table top, 6 ft. by 5 ft., scale 1 in. = 4 ft.
7. A floor, 6 yd. by 9 yd., scale 1 in. = 4 yd.
8. A rug, 4 yd. by 7 yd., scale 1 in. = 4 yd.
9. An oblong kite, 30 in. by 18 in., scale $\frac{1}{6}$.
10. A window, 7 ft. by 3 ft., scale 1 in. = 2 ft.
11. A roof, 40 ft. by 28 ft., scale 1 in. = 8 ft.
12. A flower bed, 25 ft. by 15 ft., scale 1 in. = 10 ft.

For review or for class work vary the foregoing exercises thus:

(*a*) Let each pupil draw the figure for one exercise to some convenient scale, and write the scale below.

(*b*) Let the pupils exchange papers.

(*c*) Let each pupil find, by measuring the figure received and by using the scale, the true length and width and then the area.

How many square inches are there in:

13. 2 sq. ft.?
14. $1\frac{1}{2}$ sq. ft.?
15. $2\frac{1}{4}$ sq. ft.?
16. $5\frac{7}{8}$ sq. ft.?
17. $3\frac{3}{4}$ sq. ft.?
18. $4\frac{5}{8}$ sq. ft.?

How many square feet are there in:

19. 2 sq. yd.?

20. 15 sq. yd.?

21. $1\frac{2}{3}$ sq. yd.?

22. $4\frac{1}{3}$ sq. yd.?

23. A room is 24 ft. long and 21 ft. wide. How many yards of carpet 1 yard wide are needed to cover the floor? Explain with a plan, scale 1 in. = 4 yd.

24. Draw a plan of a garden 160 ft. by 80 ft. to the scale 1 in. = 16 ft. Find the perimeter and the area.

25. Find the area and the perimeter of a city lot 32 feet wide and 150 feet long.

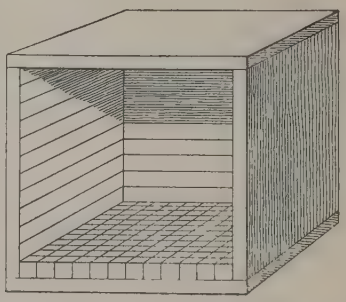
26. Estimate the length, width, area, and perimeter of your schoolroom floor. Measure the length and the width; find the area and the perimeter.

Draw a plan of the floor, to any convenient scale.

27. Estimate and find by measuring, the area of doors, windows, blackboards, etc., in your schoolroom.

221. Measuring volume.

1. The inside of this box is 1 foot long, 1 foot wide, and 1 foot deep. How many cubic feet will the box contain?

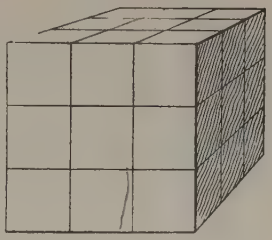


2. To find how many cubic inches it will hold, put a layer of inch cubes in the bottom of the box, as in the picture.

Since the bottom of the box is 1 foot square, how many cubic inches are there in this layer?

3. Since the box is 1 foot high, how many such layers are required to fill the box? Find by multiplication the number of cubic inches in a cubic foot.

4. Each edge of this block is 1 yard long. What is the volume of the block?



5. Since the top face of the block is 1 yard square, how many cubic feet are there in the top layer of foot cubes? in each layer?

6. Since the block is 1 yard high, how many such layers are there? 1 cu. yd. = —— cu. ft.

7. Learn this table of **measures of volume**:

1728 cubic inches (cu. in.)	**= 1 cubic foot (cu. ft.)**
27 cubic feet	**= 1 cubic yard (cu. yd.)**

WRITTEN EXERCISES

222. 1. Joel's wagon box is 20 inches long, 16 inches wide, and 5 inches deep, measured on the inside. How many cubic inches of sand are required to cover the bottom to a depth of 1 in.? 2 in.? 4 in.?

How much more or less than a cubic foot of sand will the wagon box hold?

2. How many cubic feet of ice are required to fill a wagon box 9 feet long and 3 feet wide to a depth of 1 foot? to a depth of 2 feet?

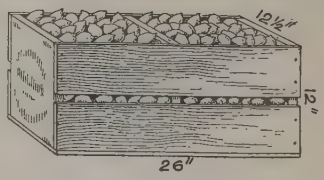
How many cubic yards of ice are required to fill the wagon box to a depth of 3 feet?

3. Mr. Sheldon has a water tank 18 ft. long, 4 ft. wide, and 3 ft. deep. How many cubic feet of water are there in the tank when the water is a foot deep in the tank? 2 ft. deep? when the tank is full?

4. A man loaded a car that was 8 ft. wide and 7 ft. high, inside measurements, with boxes 2 ft. by 2 ft. by 1 ft., laying the boxes flatwise. How many boxes were required for one tier across the end of the car?

How many boxes did the car hold, if it was 38 ft. long?

5. How much more than 2 cu. ft. of space will a crate like this occupy?



6. Each half of the crate is 12 in. by $11\frac{1}{2}$ in. by $11\frac{1}{2}$ in., inside dimensions. How much less than 2 cu. ft. will the crate hold?

7. George and Alfred estimated the dimensions of a room, then found the exact dimensions by measuring, thus:

	Length	Width	Height
George's estimate . . .	20 ft.	20 ft.	11 ft.
Alfred's estimate . . .	22 ft.	18 ft.	10 ft.
Measured dimensions . .	21 ft.	18 ft.	9 ft.

What was the actual volume of the room?

What was the volume according to George's estimate? How many cubic feet too much did his estimate give?

What was the amount of error in Alfred's estimate?

Whose estimate was the more accurate?

Some boys and girls did the following work in estimating and measuring. Only the best estimates are given here. Find the true volume and the error in each case.

	Thing Measured	Estimated Dimensions	Measured Dimensions
8.	Box	16″ by 12″ by 9″	15″ by 12″ by 10″
9.	Chalk box	7″ by 4″ by 4″	6″ by 4″ by $3\frac{1}{2}$″
10.	Room	17′ by 14′ by 9′	18′ by 12′ by 9′
11.	Bookcase	50″ by 16″ by 60″	54″ by 14″ by 60″
12.	Stone step	96″ by 12″ by 12″	90″ by 10″ by 10″
13.	Coal bin	15′ by 6′ by 8′	14′ by 5′ by $8\frac{1}{2}$′

14. Estimate and measure the dimensions and volume of various things, as boxes, rooms, cabinets, etc.

MULTIPLICATION

EXERCISES

223. Add in this way: "two 13's, 26; three 13's, 39;" etc.

1.	13	26	14	28	15	30	16	32
	13	13	14	14	15	15	16	16
2.	17	18	19	20	21	22	23	24
	17	18	19	20	21	22	23	24

Multiply rapidly:

3.	13	13	14	14	15	15	16	16
	2	3	2	3	2	3	2	3

4. Multiply the numbers from 17 to 24 by 2. $2 \times 25 = ?$

5. Give the table of 2's to 25 times 2.

6. Give the table of 3's to 16 times 3.

Multiply rapidly:

7.	12	24	11	9	8	16	9	12
	4	2	11	8	6	3	7	11
8.	9	3	7	12	25	5	9	10
	5	15	7	12	2	10	12	11

9. If 2 pineapples cost 30 cents, how much will 24 pineapples cost at the same price?

10. If 3 peaches cost 2 cents, how much will 4 dozen peaches cost?

11. If 3 apples cost 2 cents, how much will 45 apples cost at the same price?

12. If 1 plum tree bears 13 pecks of plums, how many pecks will 3 such trees bear?

13. If 5 coffee trees yield 8 pounds of coffee, how many pounds will 60 trees yield? 600 trees?

Tell products at sight:

14.	3000	3100	2110	120	110	80
	7	8	9	9	11	12
15.	1300	12	150	3000	91	120
	3	50	30	16	80	12
16.	142	121	303	202	194	202
	30	70	14	17	20	16

WRITTEN EXERCISES

224. When you multiply by 11 or by 12, you should obtain the product by a single multiplication.

1. 465	2. 523	3. 4051
11	12	12
5115	6276	48612

Multiply by 5, 6, 7, 8, 9, 11, and 12:

4. 75	9. 127	14. 1025	19. 6087
5. 59	10. 243	15. 1962	20. 5871
6. 84	11. 506	16. 2888	21. 6009
7. 78	12. 782	17. 5207	22. 7407
8. 96	13. 365	18. 3670	23. 8333

24. Multiply each of the following numbers by 5, *writing only the products:*

48	96	87	58	344	4001
64	75	128	242	504	5280

25. Multiply the same numbers by 6; by 7; by 8; by 9; by 11; by 12.

EXERCISES

225. **1.** How many are 10 times 4? 10×12? 10×25? How may any number be multiplied by 10?

2. How many are 100 times 5? 100×7? 100×11? How many zeros annexed to 5 will change 5 units to 5 hundreds?

How may any number be multiplied by 100?

3. How many are 1000 times 3? 1000×16? 1000×150?

How many zeros annexed to 3 will change 3 units to 3 thousands?

How may any number be multiplied by 1000?

Multiply:

4. 256 by 10	7. 225 by 100	10. 75 by 1000
5. 481 by 10	8. 105 by 100	11. 364 by 1000
6. 5000 by 10	9. 400 by 100	12. 100 by 1000

WRITTEN EXERCISES

226. 1. Multiply 43 by 2000.

$$\begin{array}{r} 43 \\ 2{,}000 \\ \hline 86{,}000 \end{array}$$

1000 times 43 = 43,000.

2000 times 43 = 2 times 43,000.

First write three zeros in the product, for the product must be some number of thousands. Next multiply 43 by 2 to find the number of thousands.

Multiply:

2. $\begin{array}{r} 81 \\ 2000 \\ \hline \end{array}$	3. $\begin{array}{r} 411 \\ 300 \\ \hline \end{array}$	4. $\begin{array}{r} 2314 \\ 20 \\ \hline \end{array}$	5. $\begin{array}{r} 163 \\ 120 \\ \hline \end{array}$
6. 256 by 70	12. 27 by 800	18. 15 by 7000	
7. 409 by 80	13. 166 by 600	19. 44 by 2000	
8. 890 by 90	14. 225 by 400	20. 32 by 3000	
9. 67 by 110	15. 625 by 120	21. 480 by 1200	
10. 82 by 120	16. 435 by 200	22. 750 by 1100	
11. 175 by 120	17. 875 by 110	23. 23 by 4000	

24. Multiply 346 by 278.

346, **multiplicand**	2768 is the *first partial product;*
278, **multiplier**	2422 tens, or 24,220, is the *second*
2768	*partial product;* 692 hundreds, or
2422	69,200, is the *third partial product.*
692	The sum of the partial products,
96188, **product**	or 96,188, is the entire product.

Test the answer by multiplying 278 by 346.

Find products and test:

25. 135×247	**30.** 78×967	**35.** 99×999
26. 225×144	**31.** 166×585	**36.** 830×87
27. 396×95	**32.** 228×417	**37.** 281×281
28. 89×788	**33.** 756×121	**38.** 197×287
29. 415×175	**34.** 537×145	**39.** 199×267

40. Multiply \$.47 by 206.

\$.47		\$.47
206		206
282	The partial product by 0	282
00	tens may be omitted, as in	94
94	the second process.	\$96.82
\$96.82		

Find products and test:

41. 16×436	**43.** 89×77	**45.** 101×202
42. 106×436	**44.** 89×707	**46.** 308×207

Find the cost of:

47. 144 hats @ $2.25.
48. 800 horses @ $132.
49. 704 books @ $1.10.
50. 64 pianos @ $475.
51. 48 rings @ $16.75.
52. 120 bicycles @ $37.
53. 56 watches @ $15.85.
54. 200 hammocks @ $1.35.
55. 66 shotguns @ $14.10.
56. 809 tickets @ $.75.
57. 42 cameras @ $22.50.
58. 55 automobiles @ $675.
59. 120 pairs gloves @ $.95.
60. 288 pairs shoes @ $3.15.
61. 2000 bu. of corn @ $.42.
62. 326 bottles perfume @ $.85.

63. Find how much it will cost to fence in a lot 18 rods long and 8 rods wide at $1.25 a rod.

64. How much will it cost to construct a sidewalk 12 feet wide in front of a lot 33 feet wide, at $2.25 per square yard?

65. A man bought 20 bushels of wheat for $17.50. Afterward he bought 400 bushels at the same price. How much did the second purchase cost him?

66. How many cubic feet are there in 115 cubic yards?

67. A car contained 170 barrels of flour. A barrel of flour weighs 196 pounds. How many pounds of flour were there in the car?

68. Find the cost of 8 dozen boxes of writing paper at $.27 per box.

69. A yard 165 feet square is inclosed on three sides by a tight board fence 6 feet high. Find the cost of painting both sides of the fence at $.15 a square yard.

DIVISION

EXERCISES

227. Answer quickly:

1. $8\overline{)48}$ $9\overline{)63}$ $11\overline{)99}$ $12\overline{)96}$ $11\overline{)121}$ $12\overline{)108}$

2. $\frac{1}{9}$ of $81 = ?$ $\frac{1}{12}$ of $144 = ?$ $\frac{1}{7}$ of $84 = ?$ $\frac{1}{11}$ of $132 = ?$

3. $26 \div 2 = ?$ $26 \div 13 = ?$ $32 \div 16 = ?$ $48 \div 3 = ?$

4. $45 \div 15 = ?$ $42 \div 3 = ?$ $\frac{1}{3}$ of $39 = ?$ $\frac{1}{2}$ of $34 = ?$

5. Of what two numbers is 12 the product? Give two others.

6. Of what two numbers is 24 the product? Answer the question in as many ways as you can.

7. Do the same with other numbers from 10 to 50.

When eggs cost 24¢ per dozen, find the cost of:

8. 1 egg; 7 eggs; 12 eggs + 7 eggs, or 19 eggs.

9. $\frac{1}{3}$ doz. eggs, or 4 eggs; 12 eggs + 4 eggs, or 16 eggs.

10. Find the cost of 15 oranges at 36 cents a dozen, without finding the cost of 1 orange.

11. When photographs cost \$4 a dozen, how many photographs can be bought for \$1? for \$10?

12. I paid the milkman \$2 for 34 quart tickets. How many quarts of milk did he sell for a dollar?

13. A woman paid 42 cents for 3 dozen buttons. How much did they cost per dozen?

14. When 2 boxes of berries cost 15 cents, how many boxes can be bought for 45 cents?

Tell quotients at sight:

15. 11)77 11)770 7)5600 7)5670 7)5607

16. 8)6400 9)5418 11)2233 12)3648 12)48072

WRITTEN EXERCISES

228. 1. Divide 3072 by 12.

256, **quotient**
Divisor, 12)3072, **dividend**
24
67
60
72
72

12)3072
256

The first process is called **long division**; the second, **short division.**

Hereafter you should always use short division when the divisor is not greater than 12.

Practice on the following exercises until you can work them all correctly in 3 minutes or less:

2. 2)16170
3. 3)48210
4. 4)70204
5. 5)32615
6. 6)43224
7. 7)29442
8. 8)50792
9. 9)77778
10. 8)10000
11. 9)10152
12. 8)91056
13. 11)10010
14. 12)1728
15. 12)10056
16. 11)79387
17. 11)10505
18. 12)11088
19. 12)89424

20. Find $\frac{1}{12}$ of 20,000.

12)20000

$1666\frac{8}{12}$, or $1666\frac{2}{3}$

How is $\frac{1}{12}$ of any number found? How many times does 20,000 contain 12, and how many units remain to be divided by 12?

How is $\frac{1}{12}$ of 8, or $8 \div 12$, written as a fraction? In what other form may we write $\frac{8}{12}$?

Find the value of:

21. $\frac{1}{8}$ of 1860
22. $\frac{1}{6}$ of 2726
23. $\frac{1}{7}$ of 3895
24. $\frac{1}{9}$ of 4273
25. $\frac{1}{8}$ of 2874
26. $\frac{1}{5}$ of 39,893
27. $\frac{1}{8}$ of 76,870
28. $\frac{1}{4}$ of 39,958
29. $\frac{1}{6}$ of 45,184
30. $\frac{1}{8}$ of 58,626
31. $\frac{1}{10}$ of 34,621
32. $\frac{1}{11}$ of 10,000
33. $\frac{1}{12}$ of 32,200
34. $\frac{1}{11}$ of 90,120
35. $\frac{1}{12}$ of 96,873

36. How many feet are there in $\frac{1}{8}$ of a mile?

37. A dozen collars cost \$1.80. Find the cost of one.

38. If 12 boys weigh 1032 pounds, what is their *average* weight; that is, the weight of each, supposing that all weigh the same?

39. Louise received 86 credits in arithmetic, 78 in language, 88 in geography, and 91 in history. What was her average of credits in these four studies?

40. If a man earns \$22.50 in 6 days, how much does he earn per day?

41. A block of candy 1 foot square and 1 inch thick was cut into inch cubes and divided equally among 9 children. How many cubes did each child receive?

EXERCISES

229. 1. Divide 90 by 10; 120 by 10; 200 by 10; 450 by 10. How may any number be divided by 10?

2. How many times is 100 contained in 500? in 900? in 1100? How may a number be divided by 100?

3. How many times is 1000 contained in 4000? in 24,000? How may a number be divided by 1000?

Divide:

4.	470 by 10	8.	1600 by 100	12.	10,000 by 1000
5.	3750 by 10	9.	8900 by 100	13.	53,000 by 1000
6.	3800 by 10	10.	9000 by 100	14.	100,000 by 1000
7.	5000 by 10	11.	10,000 by 100	15.	720,000 by 1000

230. Divide:

1.	2 dimes)18 dimes	2 tens)18 tens	20)180
2.	\$5)\$15	5 hundreds)15 hundreds	500)1500
3.	4 ¢)12 ¢	4 thousands)12 thousands	4000)12000

WRITTEN EXERCISES

1. Divide 360 by 40; 1600 by 400; 76,000 by 4000.

4Ø)36Ø	4ØØ)16ØØ	4ØØØ)76ØØØ
9	4	19

4 tens is contained in 36 tens as many times as 4 is contained in 36; 4 hundreds in 16 hundreds, as many times as 4 is contained in 16; 4 thousands in 76 thousands, as many times as 4 is contained in 76.

Divide:

2. 920 by 40
3. 5760 by 80
4. 5280 by 110
5. 1080 by 120
6. 7680 by 120
7. 33,500 by 50
8. 49,630 by 70
9. 39,000 by 130
10. 32,000 by 1600
11. 45,000 by 1500
12. $48,000 by $240
13. $34,170 by $170
14. $42,140 by $140
15. $54,000 by $2000
16. $81,000 by $3000

17. How many lots costing $500 each can be bought for $16,000?

18. How long will it take a train to run 600 miles at the rate of 40 miles an hour?

EXERCISES

231. 1. How many times is 12 contained in 24? How many times is 8 contained in 24? Why is the quotient larger in the latter case?

2. Divide 60 by 12; by 10. Which result is the larger? Which gives the larger quotient, $480 \div 12$ or $480 \div 10$? Why is the quotient larger?

Tell quotients:	Estimate quotients:	Estimate quotients:
3. $60 \div 12 = 5$	$60 \div 11 = 5 + \text{rem.}$	$60 \div 13 = 4 + \text{rem.}$
4. $100 \div 20 = 5$	$100 \div 19 = 5+$	$100 \div 21 = 4+$
5. $160 \div 20 = 8$	$160 \div 19 = ?$	$160 \div 21 = ?$
6. $210 \div 30 = ?$	$210 \div 29 = ?$	$210 \div 31 = ?$
7. $160 \div 40 = ?$	$160 \div 39 = ?$	$160 \div 41 = ?$
8. $250 \div 50 = ?$	$250 \div 49 = ?$	$250 \div 51 = ?$
9. $240 \div 30 = ?$	$240 \div 28 = ?$	$240 \div 32 = ?$
10. $320 \div 40 = ?$	$320 \div 38 = ?$	$320 \div 42 = ?$

Give quotients at sight, reading across the page:

11.	$180 \div 20$	$180 \div 19$	$180 \div 21$	$180 \div 22$
12.	$270 \div 30$	$270 \div 29$	$270 \div 31$	$270 \div 28$
13.	$200 \div 40$	$200 \div 39$	$200 \div 41$	$200 \div 42$
14.	$400 \div 50$	$400 \div 48$	$400 \div 52$	$400 \div 49$
15.	$360 \div 60$	$360 \div 59$	$360 \div 61$	$360 \div 63$
16.	$420 \div 70$	$420 \div 68$	$420 \div 72$	$420 \div 67$
17.	$320 \div 80$	$320 \div 77$	$320 \div 81$	$320 \div 84$
18.	$450 \div 90$	$450 \div 88$	$450 \div 92$	$450 \div 87$

WRITTEN EXERCISES

232. 1. Divide 25,272 by 78.

```
   324
78)25272
  234
  187
  156
   312
   312
```

Since 78 is only a little less than 80, the first figure of the quotient is estimated by dividing 252 by 80, or 25 by 8, which gives 3. Multiplying 78 by 3 and subtracting the product from 252 gives a remainder *less than the divisor*. Therefore 3 is the correct figure in the quotient.

The second figure of the quotient is estimated by dividing 18 by 8, giving 2, which is shown to be the correct figure by multiplying and subtracting as before.

Since $31 \div 8$ is nearly 4, and the true divisor is a little less than 80, we estimate the last figure of the quotient to be 4. The test by multiplication and subtraction shows that 4 is the correct figure, and that the division is exact.

The quotient, then, is 324.

Divide:

2. 456 by 19
3. 672 by 21
4. 986 by 29
5. 1302 by 31
6. 1092 by 39
7. 1066 by 41
8. 1218 by 29
9. 2842 by 49
10. 2346 by 51
11. 1716 by 52
12. 4425 by 59
13. 2074 by 61
14. 1922 by 62
15. 1449 by 69
16. 2414 by 71
17. 3318 by 79
18. 2916 by 81
19. 3738 by 89
20. 4914 by 91
21. 3168 by 99
22. 1616 by 101
23. 4687 by 109
24. 2664 by 111
25. 3927 by 119
26. 4114 by 121
27. 5246 by 122

EXERCISES.

233. Estimate the first figure of the quotient; test your estimate by multiplying mentally: (Read across the page.)

1.	$1700 \div 32$	$2000 \div 42$	$2600 \div 52$	$3200 \div 62$
2.	$2160 \div 54$	$2500 \div 64$	$2970 \div 74$	$3700 \div 94$
3.	$1380 \div 23$	$3200 \div 53$	$3100 \div 53$	$4250 \div 73$
4.	$1080 \div 36$	$1400 \div 46$	$3000 \div 76$	$2900 \div 96$
5.	$3640 \div 52$	$4400 \div 62$	$5040 \div 72$	$5700 \div 82$
6.	$3600 \div 18$	$5740 \div 28$	$7790 \div 38$	$1360 \div 68$

WRITTEN EXERCISES

234. 1. Divide \$10,812 by \$53.

204	204
\$53)\$10812	\$53)\$10812
106	106
21	212
00	212
212	
212	

What is the first remainder? Annexing 1, what is the *new dividend?*

When we see the new dividend 21, why do we write 0 in the quotient?

The figures 00 written under 21 may be omitted, as in the short process. As soon as 0 is written in the quotient, 2, the next figure of the dividend, may be brought down to form the next new dividend.

Test the answer by multiplying \$53 by 204.

Divide, and test:

2. \$1792 by 32	9. \$3612 by 84	16. 13,068 by 99
3. \$6150 by 82	10. 33,852 by 84	17. 17,475 by 75
4. \$2156 by 22	11. \$2080 by 65	18. 21,952 by 64
5. \$4745 by \$73	12. 19,630 by 65	19. 28,992 by 96
6. \$2438 by \$53	13. 17,408 by 68	20. 16,037 by 79
7. \$3196 by \$94	14. 12,654 by 57	21. 29,078 by 67
8. \$1035 by \$45	15. 15,756 by 78	22. 28,101 by 87

EXERCISES

235. Estimate the first figure of the quotient; test your estimate by multiplying mentally: (Read across the page.)

1.	$1610 \div 23$	$2350 \div 33$	$3000 \div 43$	$3790 \div 53$
2.	$2010 \div 67$	$2310 \div 77$	$2700 \div 87$	$2900 \div 97$
3.	$5400 \div 18$	$8400 \div 28$	$2000 \div 68$	$2700 \div 38$
4.	$1840 \div 46$	$2640 \div 66$	$3500 \div 86$	$2200 \div 56$
5.	$2040 \div 34$	$8425 \div 14$	$4411 \div 74$	$7377 \div 94$
6.	$5700 \div 19$	$8800 \div 29$	$1160 \div 39$	$1500 \div 49$
7.	$3780 \div 54$	$5000 \div 74$	$1600 \div 24$	$3000 \div 44$
8.	$5120 \div 64$	$6720 \div 84$	$2800 \div 34$	$7500 \div 94$
9.	$2450 \div 35$	$3180 \div 45$	$5700 \div 85$	$4500 \div 65$

WRITTEN EXERCISES

236. Find quotients, and remainders if there are any:

1.	$1{,}671 \div 23$	6.	$2{,}760 \div 87$	11.	$2{,}904 \div 46$
2.	$2{,}400 \div 77$	7.	$5{,}598 \div 18$	12.	$8{,}428 \div 14$
3.	$2{,}750 \div 87$	8.	$2{,}108 \div 68$	13.	$5{,}629 \div 74$
4.	$3{,}700 \div 53$	9.	$20{,}468 \div 68$	14.	$3{,}080 \div 54$
5.	$4{,}440 \div 63$	10.	$26{,}664 \div 46$	15.	$27{,}380 \div 54$
16.	$6{,}100 \div 19$	21.	$18{,}174 \div 78$	26.	$41{,}985 \div 27$
17.	$5{,}000 \div 74$	22.	$19{,}900 \div 99$	27.	$76{,}641 \div 46$
18.	$12{,}597 \div 39$	23.	$51{,}712 \div 64$	28.	$90{,}816 \div 86$
19.	$18{,}375 \div 75$	24.	$21{,}312 \div 48$	29.	$21{,}864 \div 24$
20.	$17{,}328 \div 57$	25.	$65{,}195 \div 85$	30.	$40{,}000 \div 99$

WRITTEN EXERCISES

237. 1. Divide 8512 by 243; also 85057 by 243.

$$\begin{array}{r} 35\frac{7}{243} \\ 243\overline{)8512} \\ 729 \\ \hline 1222 \\ 1215 \\ \hline 7 \end{array} \qquad \begin{array}{r} 350\frac{7}{243} \\ 243\overline{)85057} \\ 729 \\ \hline 1215 \\ 1215 \\ \hline 7 \end{array}$$

Divide:

2. 6,900 by 156
3. 50,160 by 114
4. 27,375 by 125
5. 86,450 by 133
6. 33,785 by 145
7. 51,500 by 156
8. 41,976 by 198
9. 12,100 by 354
10. 85,580 by 389
11. 11,571 by 133
12. 58,410 by 177
13. 71,111 by 176
14. 32,107 by 331
15. 25,801 by 344
16. 46,420 by 844
17. 30,649 by 928
18. 35,310 by 535
19. 34,899 by 646
20. 34,515 by 767
21. 34,720 by 868
22. 77,895 by 577
23. 97,356 by 244
24. 63,875 by 666
25. 43,967 by 999
26. 98,175 by 187
27. 84,668 by 244
28. 76,874 by 266
29. 84,501 by 229

WRITTEN EXERCISES

238. 1. How many days are there in 2520 hours?

2. A fruit dealer bought 44 crates of pineapples for $63.80. Find the price per crate.

3. If 25 village lots cost $3125, how much will 1 lot cost? 7 lots?

4. At a clambake 2160 clams were provided for 135 persons. How many were provided for a family of four?

5. The cost of making a mile of new gravel road was $3840. How much did it cost per rod?

6. A newspaper press has a capacity of 308 papers per minute. How long will it take to print 18,480 papers?

7. A bushel of wheat weighs 60 pounds. How many bushels are there in a car load weighing 31,200 pounds?

8. A car containing 672 bushels of grain was unloaded in 16 minutes. How many bushels were unloaded in 1 minute? in 5 minutes?

9. An electric letter-stamping machine in use in a German post office stamped 70,200 letters in 39 minutes. How many letters did it stamp per minute?

10. A fast freight ran 922 miles from New Orleans to Chicago in 55 hours. Find its rate per hour.

11. The copper ore taken from a mine in one year was valued at $88,972. How many tons of ore were mined, if the average value per ton was $58?

12. A grocer bought a car load of oranges, 362 boxes, for $814.50. How much did he pay for a box? for 50 boxes?

REVIEW

239. 1. What measures are used in measuring short lengths or distances? long ones?

2. Give the table of measures of length.

3. What measures are generally used to measure milk? oil? peanuts? meat? potatoes? candy? rice? corn? molasses? sugar? cloth? carpet? area of a floor? volume of a small box? volume of a room?

4. Give the table of liquid measures; of dry measures; of area measures; of volume measures.

5. Draw a diagram and show that a square yard equals 9 square feet. Show that 1 cu. yd. = 27 cu. ft.

6. Show how the number of square inches in a square foot is obtained; the number of cubic inches in a cubic foot.

EXERCISES

240. Name these fractions in order of size, beginning with the fraction of least value in each case:

1. $\frac{3}{6}, \frac{2}{3}, \frac{1}{6}, \frac{5}{6}$.

2. $\frac{2}{3}, \frac{1}{4}, \frac{1}{3}, \frac{3}{4}$.

3. $\frac{1}{8}, \frac{1}{2}, \frac{1}{4}, \frac{3}{8}, \frac{3}{4}, \frac{7}{8}, \frac{5}{8}$.

4. $\frac{1}{2}, \frac{1}{12}, \frac{3}{4}, \frac{2}{3}, \frac{7}{12}, \frac{5}{6}, \frac{11}{12}$.

5. How many dozen oranges are there in a box containing 96 oranges? 126 oranges? 150 oranges?

6. Our Thanksgiving Day turkey weighed $14\frac{1}{4}$ pounds. Find the cost at \$.20 a pound.

7. Percy spent 5 cents, or $\frac{1}{6}$ of his money, for peanuts. How much money had he at first? What part of his money had he left?

8. Ethel had 25 cents and spent $\frac{4}{5}$ of her money riding on a merry-go-round. How much money did she spend? What part of her money had she left?

Frank, Clara, Mabel, and Alfred made pop corn balls and candy according to the following recipes:

Pop Corn Balls	Peanut Candy	Walnut Candy
$\frac{1}{2}$ pt. molasses	$\frac{3}{4}$ pt. molasses	1 pt. molasses
$\frac{1}{2}$ lb. butter	$\frac{1}{4}$ lb. butter	$\frac{1}{8}$ lb. butter
$\frac{1}{4}$ lb. red sugar	5 qt. peanuts	$\frac{3}{4}$ lb. brown sugar
$2\frac{1}{2}$ lb. shelled pop corn	salt	$2\frac{1}{2}$ lb. English walnuts
salt		1 tablespoon vinegar

9. Frank bought the molasses. How many pints did he buy? How much did it cost at \$.32 a gallon?

10. Clara bought the butter at \$.24 a pound and the pop corn at \$.10 a pound. How much did she expend?

11. Mabel bought the sugar. She paid 4 cents a pound for brown sugar and 2 cents an ounce for red sugar. How much did she expend for sugar?

12. Alfred bought the peanuts at 5 cents a quart and the English walnuts at 16 cents a pound. How much did both cost?

13. Find the cost of all the materials, allowing 1 cent for the cost of salt and vinegar.

WRITTEN EXERCISES

241. 1. Add: \$150, \$17.85, \$42.60, \$984.10, \$2012.

2. Subtract these numbers from 100,000: 100; 1000; 10,000; 576; 8576; 62,384.

3. Subtract from \$5.00:

\$4.10	\$3.27	\$3.16	\$1.85	75¢	\$.63
\$4.75	\$2.50	\$4.19	\$2.71	48¢	\$.82

Multiply:

4. \$426 by 8
5. \$375 by 9
6. \$785 by 11
7. \$496 by 12
8. \$989 by 70
9. 264 by 120
10. 322 by 130
11. 303 by 160
12. \$796 by 87
13. \$948 by 96
14. 751 by 128
15. 265 by 379
16. 301 by 103
17. 285 by 320
18. 909 by 102

Find parts:

19. $\frac{1}{5}$ of 3275
20. $\frac{1}{3}$ of 7623
21. $\frac{1}{6}$ of 3252
22. $\frac{1}{8}$ of 5280
23. $\frac{1}{4}$ of 3212
24. $\frac{1}{4}$ of 1624
25. $\frac{1}{9}$ of 5004
26. $\frac{1}{4}$ of \$38.76
27. $\frac{1}{8}$ of \$32.64
28. $\frac{1}{12}$ of 17,028

Find quotients:

29. \$5720 ÷ 65
30. \$3510 ÷ \$78
31. \$2442 ÷ 37
32. \$3648 ÷ \$48
33. \$4089 ÷ 47
34. \$5226 ÷ \$78
35. \$8763 ÷ 127
36. \$7303 ÷ 109
37. \$9591 ÷ 139
38. \$9652 ÷ 508

Divide:

39. 57,420 ÷ 660
40. 45,280 ÷ 56
41. 29,811 ÷ 828
42. 73,855 ÷ 746
43. 82,940 ÷ 319
44. 26,680 ÷ 117
45. 86,245 ÷ 98
46. 89,991 ÷ 99
47. 98,010 ÷ 99
48. 64,280 ÷ 309

WRITTEN EXERCISES

242. 1. Hugh's horse Dexter lost a shoe, and the other three were loose. At Mr. Daly's shop he found that it cost \$.35 a shoe to reset the old shoes and \$.50 for a new shoe; but he had 4 new shoes put on. How much less would it have cost to use the old shoes?

2. It took 2 hours to shoe the horse. If shoes, calks, and nails cost 34¢, how much did Mr. Daly receive per hour for his work?

3. Mr. Daly selected 21-ounce shoes for the front feet and 18-ounce shoes for the hind feet. He shaped the shoes and welded a toe calk weighing 3 ounces to each shoe. How much did Dexter's shoes weigh?

4. Mr. Daly told Hugh that he had shod a race horse with 11-ounce shoes in front and 6-ounce shoes behind; also a draught horse with 30-ounce shoes all around. How much heavier shoes did the draught horse wear than the race horse?

5. The nails used in the draught horse's shoes were $2\frac{3}{8}$ inches long, and the shortest ones in the race horse's shoes $1\frac{9}{16}$ inches. Find the difference in length.

6. A 100-pound keg of horseshoes contained 65 horseshoes and cost \$5.20 (520¢). Find the cost per pound and per shoe.

ADDITION AND SUBTRACTION

EXERCISES

243. 1. Count by 3's from 1 to 100; by 4's from 2 to 98; by 5's from 3 to 98.

2. Count by 6's from 2 to 98; from 4 to 100; from 5 to 95.

3. Count by 7's from 1 to 99; from 3 to 94; from 6 to 97. Count by 8's from 1 to 97; from 3 to 99; from 6 to 94.

4. Count by 9's from 2 to 92; from 4 to 94; from 7 to 97.

5. Count by 10's from 4 to 94; by 11's from 5 to 93.

6. Count backward from 100 by 2's; by 3's; by 4's; by 5's; by 6's; by 7's; by 8's; by 9's; by 10's; by 11's.

EXERCISES

244. Add and subtract rapidly:

Add in exercise 1, thus: "45, 65, 73." Subtract in this way: "45, 25, 17."

1.	45	66	82	43	54	75	96	88
	28	42	69	37	38	24	52	43
2.	61	43	36	28	46	55	64	83
	32	15	28	19	28	37	46	57
3.	72	67	94	65	48	86	42	74
	29	58	18	26	39	47	19	38
4.	64	82	53	96	75	37	97	88
	48	37	29	45	57	26	68	49

5. A farmer who had 51 cows sold 17 of them. How many had he left?

6. A woman paid 56¢ for a pound of tea and 39¢ for a pound of coffee. How much did both cost?

7. From a barrel containing 50 gallons of paint, 18 gallons were sold. How much was left?

8. Roy traveled 64 miles. He went 17 miles in a sleigh and the rest of the way by train. How far did he go by train?

9. There are 16 boys in the arithmetic class and 31 girls. How many pupils are there in the class?

10. Oscar spent 54¢ for valentines, and his brother spent 38¢. How much did both boys spend?

How much more did Oscar spend than his brother?

WRITTEN EXERCISES

245. Subtract and test:

Practice until you can do exercises 1–15 in less than $3\frac{1}{2}$ minutes

1.	2.	3.	4.	5.
\$275.50	\$589.72	\$326.17	\$603.00	\$428.62
113.24	297.86	89.68	446.36	147.93
6.	**7.**	**8.**	**9.**	**10.**
\$790.74	\$235.40	\$823.95	\$361.33	\$993.81
346.98	65.75	536.28	84.66	798.47
11.	**12.**	**13.**	**14.**	**15.**
\$420.53	\$706.04	\$900.00	\$640.30	\$805.07
25.86	472.85	639.22	350.64	99.99

Add and test exercises 16–25 in less than 8 minutes:

16.	17.	18.	19.	20.
39,636	23,809	98,437	7,348	28,398
14,684	7,634	4,689	42,789	76,495
49,871	19,872	57,923	16	48,973
27,588	56,391	37	8,547	52,798
89,663	4,589	12,463	96,873	86,698
68,942	73,862	899	8,439	98,765

21.	22.	23.	24.	25.
$134.50	$896.38	$475.89	$563.47	$897.69
296.22	147.99	742.78	28.69	576.39
452.31	89.74	9.27	8.00	768.48
235.54	5.30	.63	.96	947.96
648.25	67.28	27.45	.08	678.89
379.86	795.89	638.03	89.76	836.78
523.75	427.76	277.54	798.65	458.99

MULTIPLICATION

EXERCISES

246. 1. Count by 2's from 0 to 100; by 3's to 99; by 4's to 96; by 5's to 100.

2. Count by 6's from 0 to 96; by 7's to 98; by 8's to 96; by 9's to 108.

3. Count by 10's from 0 to 120; by 11's to 132; by 12's to 144.

4. Count by 13's from 0 to 52; by 14's to 42; by 15's to 45; by 16's to 48.

MULTIPLICATION TABLE

247. Thoroughly review and memorize:

1 × 1 = 1	1 × 2 = 2	1 × 3 = 3	1 × 4 = 4
2 × 1 = 2	2 × 2 = 4	2 × 3 = 6	2 × 4 = 8
3 × 1 = 3	3 × 2 = 6	3 × 3 = 9	3 × 4 = 12
4 × 1 = 4	4 × 2 = 8	4 × 3 = 12	4 × 4 = 16
5 × 1 = 5	5 × 2 = 10	5 × 3 = 15	5 × 4 = 20
6 × 1 = 6	6 × 2 = 12	6 × 3 = 18	6 × 4 = 24
7 × 1 = 7	7 × 2 = 14	7 × 3 = 21	7 × 4 = 28
8 × 1 = 8	8 × 2 = 16	8 × 3 = 24	8 × 4 = 32
9 × 1 = 9	9 × 2 = 18	9 × 3 = 27	9 × 4 = 36
10 × 1 = 10	10 × 2 = 20	10 × 3 = 30	10 × 4 = 40
11 × 1 = 11	11 × 2 = 22	11 × 3 = 33	11 × 4 = 44
12 × 1 = 12	12 × 2 = 24	12 × 3 = 36	12 × 4 = 48
1 × 5 = 5	1 × 6 = 6	1 × 7 = 7	1 × 8 = 8
2 × 5 = 10	2 × 6 = 12	2 × 7 = 14	2 × 8 = 16
3 × 5 = 15	3 × 6 = 18	3 × 7 = 21	3 × 8 = 24
4 × 5 = 20	4 × 6 = 24	4 × 7 = 28	4 × 8 = 32
5 × 5 = 25	5 × 6 = 30	5 × 7 = 35	5 × 8 = 40
6 × 5 = 30	6 × 6 = 36	6 × 7 = 42	6 × 8 = 48
7 × 5 = 35	7 × 6 = 42	7 × 7 = 49	7 × 8 = 56
8 × 5 = 40	8 × 6 = 48	8 × 7 = 56	8 × 8 = 64
9 × 5 = 45	9 × 6 = 54	9 × 7 = 63	9 × 8 = 72
10 × 5 = 50	10 × 6 = 60	10 × 7 = 70	10 × 8 = 80
11 × 5 = 55	11 × 6 = 66	11 × 7 = 77	11 × 8 = 88
12 × 5 = 60	12 × 6 = 72	12 × 7 = 84	12 × 8 = 96
1 × 9 = 9	1 × 10 = 10	1 × 11 = 11	1 × 12 = 12
2 × 9 = 18	2 × 10 = 20	2 × 11 = 22	2 × 12 = 24
3 × 9 = 27	3 × 10 = 30	3 × 11 = 33	3 × 12 = 36
4 × 9 = 36	4 × 10 = 40	4 × 11 = 44	4 × 12 = 48
5 × 9 = 45	5 × 10 = 50	5 × 11 = 55	5 × 12 = 60
6 × 9 = 54	6 × 10 = 60	6 × 11 = 66	6 × 12 = 72
7 × 9 = 63	7 × 10 = 70	7 × 11 = 77	7 × 12 = 84
8 × 9 = 72	8 × 10 = 80	8 × 11 = 88	8 × 12 = 96
9 × 9 = 81	9 × 10 = 90	9 × 11 = 99	9 × 12 = 108
10 × 9 = 90	10 × 10 = 100	10 × 11 = 110	10 × 12 = 120
11 × 9 = 99	11 × 10 = 110	11 × 11 = 121	11 × 12 = 132
12 × 9 = 108	12 × 10 = 120	12 × 11 = 132	12 × 12 = 144

EXERCISES

248. Multiply, giving results instantly:

1.	5	7	8	2	11	6	3	10	5
	6	4	3	9	4	6	7	9	11
2.	7	6	9	7	8	3	5	7	12
	7	4	3	11	4	12	9	6	4
3.	8	5	11	8	6	4	11	12	5
	6	7	6	8	10	9	8	6	8
4.	10	9	7	9	7	5	9	7	8
	7	9	8	11	9	12	6	12	9
5.	12	10	9	11	10	8	11	11	12
	8	10	12	10	12	10	11	12	12
6.	13	13	13	14	14	15	15	15	16
	2	3	4	2	3	3	4	5	2
7.	16	17	18	20	20	20	24	25	25
	3	2	2	3	4	5	2	3	4

8. What is the perimeter of a 12-foot square?

9. If a horse travels 6 miles an hour, how far at that rate will he go in 8 hours?

10. If a window contains 6 panes of glass, how many panes do 11 such windows contain?

11. How many quarts of milk are there in 12 cans, each containing 8 quarts?

12. Find the cost of 2 lb. of beefsteak at 18¢ a pound.

13. Find the cost of 2 collars @ 15¢; of 3 ties @ 25¢.

14. When sugar is sold at the rate of 16 pounds for $1, how many pounds can be bought for $3?

15. Find how many square rods there are in a lot 9 rods wide and 12 rods long.

16. At $3 an acre, how much will it cost to plow a field containing 15 acres?

WRITTEN EXERCISES

249. Multiply by 6, 7, 8, 9, 11, and 12:

1. 48	3. 269	5. $19.72	7. $476.25
2. 97	4. 848	6. $74.89	8. $638.63

Multiply:

9. 276 by 400	12. 89 by 2000	15. 6709 by 30
10. 742 by 600	13. 78 by 5000	16. 8524 by 90
11. 827 by 800	14. 99 by 7000	17. 9047 by 80

Multiply:

18. $8.97 by 16	21. $74.39 by 49	24. $4.56 by 394
19. $7.65 by 27	22. $83.76 by 65	25. $6.43 by 586
20. $9.84 by 38	23. $68.92 by 78	26. $8.39 by 759

Find products and test:

27. 237×456	31. 594×603	35. 689×508
28. 468×509	32. 706×498	36. 796×609
29. 608×258	33. 873×507	37. 857×786
30. 805×387	34. 908×702	38. 968×897

MEASURING

EXERCISES

250. 1. Find the number of inches in a yard; in $\frac{1}{4}$ yd.; in $\frac{1}{2}$ yd.; in $\frac{3}{4}$ yd.; in $1\frac{1}{4}$ yd.; in $10\frac{1}{4}$ yd.

2. Draw a line 1 yard long. Divide it into halves. Mark off the feet. How many feet are there in $\frac{1}{2}$ yd.?

3. How many feet are there in 1 yd. 1 ft.? in 1 yd. $1\frac{1}{2}$ ft.? in $1\frac{1}{2}$ yd.? in $3\frac{1}{2}$ yd.? in $5\frac{1}{2}$ yd.?

What is the distance $5\frac{1}{2}$ yards called?

4. How many rods are there in a mile? in $\frac{1}{2}$ mile? in $\frac{1}{4}$ mile? in $\frac{3}{4}$ mile? in $\frac{1}{8}$ mile?

5. Give the table of measures of length.

6. How many square inches are there in a square foot? How many square feet are there in a square yard?

$\frac{1}{12}$ sq. ft. = —— sq. in. $\frac{2}{3}$ sq. yd. = —— sq. ft.

7. Give the table of measures of volume.

$\frac{2}{3}$ cu. yd. = —— cu. ft. $1\frac{1}{3}$ cu. yd. = —— cu. ft.

8. Give the table of liquid measure; of dry measure.

9. How many quarts are there in 1 gal. 2 qt.? in $1\frac{1}{2}$ gal.? in $2\frac{3}{4}$ gal.? in 5 gal. 1 qt.? in $10\frac{1}{2}$ gal.?

10. How many pints are there in a gallon? in $\frac{1}{2}$ gal.? in $\frac{7}{8}$ gal.? in $1\frac{1}{2}$ gal.? in $12\frac{1}{2}$ gal.?

11. How many pecks are there in 1 bu. 2 pk.? in $2\frac{1}{2}$ bu.? in $1\frac{3}{4}$ bu.? in $2\frac{1}{4}$ bu.?

12. How many quarts are there in a bushel? in $\frac{3}{8}$ bu.?

WRITTEN EXERCISES

251. 1. How many feet are there in 5 yards 2 feet?

SOLUTION

1 yd. = 3 ft.

5 yd. = 5 × 3 ft. = 15 ft.

5 yd. 2 ft. = 15 ft. + 2 ft. = 17 ft.

2. How many quarts are there in 5 bushels?

SOLUTION

1 bu. = 4 pk.; 1 pk. = 8 qt.

1 bu. = 4 × 8 qt. = 32 qt.

5 bu. = 5 × 32 qt. = 160 qt.

Finding the number of feet in 5 yards 2 feet is called **reducing** 5 yards 2 feet *to feet*. Finding the number of quarts in 5 bushels is called **reducing** 5 bushels *to quarts*.

Reduce:

3. 14 yd. 2 ft. to feet.
4. 5 yd. $1\frac{1}{2}$ ft. to feet.
5. 8 gal. 2 qt. to quarts.
6. 12 pk. 4 qt. to quarts.
7. 11 gal. to pints.
8. 5 sq. yd. 5 sq. ft. to sq. ft.
9. 3 bu. to quarts.
10. 2 lb. 5 oz. to ounces.
11. 3 mi. 20 rd. to rods.
12. $2\frac{3}{4}$ mi. to rods.
13. 3 yd. to inches.
14. $1\frac{1}{2}$ sq. yd. to sq. in.

15. Mt. Whitney is 14,502 feet high (above sea level). How many feet less than 3 miles high is it?

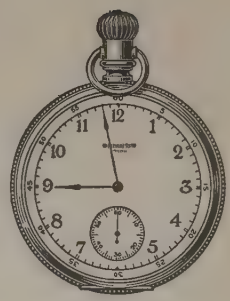
16. A can for maple sirup is 5 in. by 5 in. by $9\frac{1}{4}$ in. How much more or less than a gallon (231 cu. in.) will it hold?

252. Measuring time.

1. Write the present date. What time measures are used in writing dates? Name several smaller time measures.

2. How many hands has a watch?

The smallest hand is called the *second hand.*



3. How many little spaces does the second hand move over while the minute hand moves over one minute space?

How many seconds, then, equal one minute?

4. Learn this table of **measures of time**:

60 seconds (sec.)	**= 1 minute (min.)**
60 minutes	**= 1 hour (hr.)**
24 hours	**= 1 day (da.)**
7 days	**= 1 week (wk.)**
365 days	**= 1 year (yr.)**

5. There are 12 months in a year. Name them.

6. Four of these months have 30 days each. All the rest, except February, have 31 days each.

February usually has 28 days, but once in four years it has 29 days. The years in which February has 29 days are called **leap years**. Leap years have 366 days.

Thirty days have September,
April, June, and November.
All the rest have thirty-one,
Save February, which alone
Has twenty-eight; and one day more
We add to it one year in four.

WRITTEN EXERCISES

253. Reduce and explain each reduction:

1. $5\frac{3}{4}$ min. to seconds.
2. 3 hr. 20 min. to minutes.
3. 2 yr. 15 da. to days.
4. 16 wk. 3 da. to days.
5. $2\frac{1}{2}$ hr. to seconds.
6. 3 da. 12 hr. to hours.
7. A watch gained 2 minutes during September. How many seconds did it gain a day?
8. A horse trotted a mile in 2 min. 12 sec. How many feet did the horse trot per second?

254. Measuring weight.

1. Name things sold by the pound; by the ounce.
2. The butcher sells meat by the pound. He buys it by the *hundred pounds*, or **hundredweight**.

How do you think cattle, hogs, and sheep are sold?

3. The dairyman often buys bran and feed by the hundredweight.

The dealer buys such things in larger quantities, by the 2000 pounds, or **ton**.

Mention other articles sold by the ton.

4. How many hundredweight are there in a ton?
5. Iron ore, iron, and steel (except iron and steel in bars) are sold by a larger ton of 2240 pounds, called a **long ton.**

6. Learn this table of **measures of weight**:

16 ounces (oz.)	**= 1 pound (lb).**
100 pounds	**= 1 hundredweight (cwt.)**
20 hundredweight	**= 1 ton (T.)**
2240 pounds	**= 1 long ton (L.T.)**

WRITTEN EXERCISES

255. Reduce, and explain each reduction:

1. 4 lb. 8 oz. to ounces.
2. $12\frac{1}{4}$ cwt. to pounds.
3. 3 T. 375 lb. to pounds.
4. $7\frac{3}{4}$ T. to cwt.
5. $\frac{1}{10}$ T. to ounces.
6. 5 cwt. 80 lb. to lb.

Find the cost of:

7. $2\frac{1}{4}$ T. of hay at \$11.60 per ton.
8. 2 T. 6 cwt. of bran at \$1.20 per cwt.
9. 32 T. of coal at \$4.50 per ton.
10. $7\frac{1}{2}$ cwt. of beef at \$10.40 per cwt.
11. 145 cwt. of bar iron at \$2.05 per cwt.
12. 200 long tons of steel rails @ \$28.

256. Measuring land.

1. What is the area of a building lot 30 ft. by 150 ft.?

2. A square, each of whose sides is 1 rod long, is called a **square rod** (sq. rd.).

3. What, then, is the area of a pasture lot 10 rods by 16 rods? of a garden 20 rods by 8 rods?

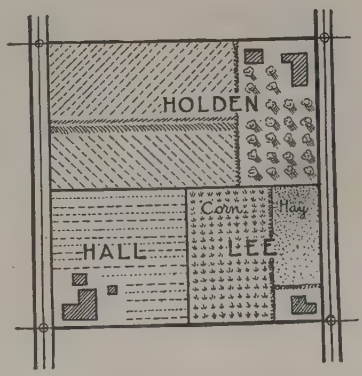
160 square rods is called an **acre** (A.).

4. Tell in acres the area of the pasture lot mentioned in exercise 3; the area of the garden.

5. What is the area in acres of a peach orchard 40 rods square? of a cotton field 80 rods long and 60 rods wide?

WRITTEN EXERCISES

257. 1. Several years ago Mr. Taylor bought the tract of land 160 rods square, shown in this map with its corners marked ⊕. How much did the land cost him at $25 an acre?



2. When the roads on the east and west sides were laid out, each 4 rods wide, half the width of each was taken from Mr. Taylor's land. How many acres less had he than before?

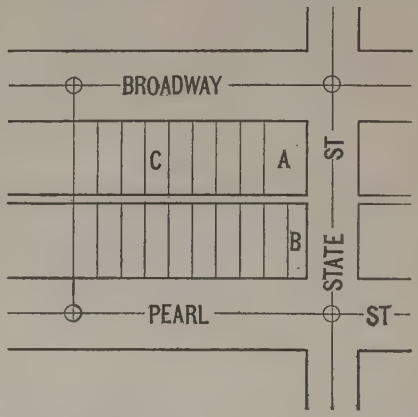
3. Mr. Taylor sold the north half of his farm, between the roads, to Mr. Holden, at $45 an acre. How much did he receive for that part of his farm?

4. Later he sold the southwest quarter, 78 rd. by 80 rd., to Mr. Hall, at $65 per acre, and the southeast quarter to Mr. Lee at $75 per acre. How much did he receive for each of these farms?

5. Mr. Lee's corn field is 80 rd. by 46 rd.; his meadow, 60 rd. by 32 rd.; and the lot for buildings, garden, etc., 20 rd. by 32 rd. Find the number of acres in each part.

6. Before Broadway, State St., and Pearl St. were laid out, Mr. Adams paid \$120 an acre for a piece of land $26\frac{2}{3}$ rd. by 24 rd., shown here with the corners marked ⊕.

Find the cost of the land.



7. When the streets and the alley were laid out, Mr. Adams divided the land left into lots, each 40 ft. by 132 ft., except A and B.

He sold four 40-foot lots at \$150 each. How much did he receive for them?

8. Later he sold eight 40-foot lots at \$15 a front foot, and still later five more at \$22 a front foot. How much did he receive from these sales?

9. He sold lot B, 36 ft. by 132 ft., at \$.30 a square foot. How much did he receive for lot B?

10. Later, one man offered him \$60 a front foot for lot A, which is 76 ft. wide; and another man offered him \$5000 for the lot. Which was the better offer, and how much?

11. When Broadway was paved, the owner of lot C had to pay for a strip of pavement 40 ft. by 39 ft. Find the expense to him at \$2.25 per square yard.

12. Find the cost of paving the alley, 12 ft. by 396 ft., at \$1.75 per square yard.

FRACTIONS

258. 1. What is a fraction? Write a fraction.

2. Write the fraction that stands for 3 of the 4 equal parts of 1; 5 of the 6 equal parts of 1.

3. The fraction $\frac{7}{8}$ stands for 7 of the 8 equal parts of 1. In this fraction 7 is called the **numerator**, and 8 the **denominator**; 7 and 8 are called the **terms** of the fraction.

4. What is the numerator of the fraction $\frac{3}{5}$? the denominator? What are the terms of the fraction?

5. What are the terms of $\frac{1}{6}$? of $\frac{5}{8}$? of $\frac{4}{5}$?

259. Reducing fractions to lower or higher terms.

1. How many *tenths* of this oblong are shaded? how many fifths? Then $\frac{4}{10} = ?$

Which fraction has the smaller, or lower, terms, $\frac{4}{10}$ or $\frac{2}{5}$?

Changing $\frac{4}{10}$ to the *equal* fraction $\frac{2}{5}$ is called **reducing** $\frac{4}{10}$ to *lower* terms.

2. What number will exactly divide both terms of $\frac{4}{10}$? What fraction is obtained by dividing the terms of $\frac{4}{10}$ by 2? Then how may $\frac{4}{10}$ be reduced to lower terms?

3. Can you reduce $\frac{2}{5}$ to lower terms?
Then $\frac{4}{10}$ reduced to *lowest* terms is $\frac{2}{5}$.

4. Reduce to lowest terms: $\frac{2}{4}$; $\frac{6}{8}$; $\frac{3}{6}$; $\frac{6}{9}$; $\frac{2}{8}$; $\frac{3}{12}$; $\frac{4}{12}$.

5. Look at the oblong and tell the number of tenths in $\frac{3}{5}$. Changing $\frac{3}{5}$ to $\frac{6}{10}$ is called *reducing* $\frac{3}{5}$ to *higher* terms.

6. Multiply both terms of $\frac{3}{5}$ by 2. To what fraction does this change $\frac{3}{5}$? Then how may $\frac{3}{5}$ be reduced to tenths?

7. How may $\frac{1}{2}$ be reduced to sixths? $\frac{1}{3}$ to ninths? $\frac{1}{4}$ to eighths? $\frac{4}{5}$ to tenths?

8. Reduce to twelfths: $\frac{1}{2}$; $\frac{1}{3}$; $\frac{1}{4}$; $\frac{1}{6}$; $\frac{2}{3}$; $\frac{3}{4}$; $\frac{5}{6}$.

Multiplying or dividing both terms of a fraction by the same number does not change its value.

EXERCISES

260. 1. Change $\frac{1}{2}$ to eighths; to tenths; to twelfths; to sixteenths; to twentieths; to twenty-fourths.

2. Change $\frac{2}{3}$ to sixths; to ninths; to twelfths; to fifteenths; to eighteenths; to twenty-fourths; to thirtieths.

3. Reduce to twentieths: $\frac{1}{4}$; $\frac{1}{5}$; $\frac{1}{10}$; $\frac{3}{4}$; $\frac{2}{5}$; $\frac{3}{10}$; $\frac{4}{5}$; $\frac{7}{10}$.

4. Reduce to twenty-fourths: $\frac{3}{4}$; $\frac{5}{6}$; $\frac{3}{8}$; $\frac{5}{12}$; $\frac{7}{8}$.

5. Reduce to hundredths: $\frac{1}{2}$; $\frac{3}{4}$; $\frac{2}{5}$; $\frac{7}{10}$; $\frac{3}{20}$; $\frac{8}{25}$; $\frac{17}{50}$.

Reduce to lowest terms:

6. $\frac{5}{10}$	10. $\frac{10}{15}$	14. $\frac{21}{28}$	18. $\frac{25}{100}$	22. $\frac{36}{48}$
7. $\frac{8}{12}$	11. $\frac{10}{12}$	15. $\frac{12}{32}$	19. $\frac{40}{100}$	23. $\frac{24}{64}$
8. $\frac{4}{16}$	12. $\frac{15}{20}$	16. $\frac{18}{36}$	20. $\frac{50}{100}$	24. $\frac{45}{72}$
9. $\frac{9}{12}$	13. $\frac{16}{24}$	17. $\frac{16}{40}$	21. $\frac{75}{100}$	25. $\frac{32}{80}$

261. Reducing integers and mixed numbers to fractions.

1. Which is less, the numerator of $\frac{3}{4}$ or the denominator? the numerator or the denominator of $\frac{4}{5}$? of $\frac{3}{8}$? of $\frac{5}{6}$?

A fraction whose numerator is less than its denominator is called a **proper fraction**.

2. Which is less, $\frac{3}{4}$ or 1? $\frac{4}{5}$ or 1? $\frac{3}{8}$ or 1? $\frac{5}{6}$ or 1?

A *proper fraction* is *less* than 1.

3. How does the numerator compare with the denominator in $\frac{2}{2}$? in $\frac{3}{2}$? in $\frac{4}{3}$? in $\frac{5}{4}$? in $\frac{6}{6}$?

A fraction whose numerator is equal to or greater than its denominator is called an **improper fraction**.

4. How does $\frac{2}{2}$ compare with 1? $\frac{3}{2}$ with 1? $\frac{4}{3}$? $\frac{5}{4}$? $\frac{6}{6}$?

An *improper fraction* is *equal* to or *greater* than 1.

5. How many fourths are there in 1? in 2? in 3? in 3 and $\frac{1}{4}$? in $3\frac{1}{4}$? in 5 and $\frac{3}{4}$? in $5\frac{3}{4}$?

6. How many fifths are there in 3? in $3\frac{2}{5}$? in $5\frac{4}{5}$?

7. Reduce 2 to halves; 4 to thirds; 3 to fifths.

8. Reduce $2\frac{1}{2}$ to halves; $4\frac{2}{3}$ to thirds; $3\frac{4}{5}$ to fifths; $5\frac{1}{6}$ to sixths; $4\frac{3}{8}$ to eighths; $6\frac{3}{10}$ to tenths.

EXERCISES

262. Reduce to an improper fraction:

1. $7\frac{1}{2}$	4. $2\frac{5}{8}$	7. $8\frac{2}{3}$	10. $7\frac{5}{6}$	13. $10\frac{4}{5}$
2. $5\frac{1}{3}$	5. $3\frac{1}{6}$	8. $6\frac{3}{4}$	11. $4\frac{3}{10}$	14. $12\frac{3}{4}$
3. $4\frac{3}{5}$	6. $9\frac{1}{4}$	9. $5\frac{3}{8}$	12. $8\frac{5}{12}$	15. $11\frac{7}{8}$

WRITTEN EXERCISES

263. 1. Reduce 27 to halves; to thirds; to fourths.

2. Change 32 to a fraction whose denominator is 3; 5; 8.

Reduce to an improper fraction:

3. $25\frac{1}{2}$	5. $19\frac{3}{4}$	7. $34\frac{5}{6}$	9. $48\frac{9}{10}$	11. $26\frac{13}{16}$
4. $43\frac{2}{3}$	6. $27\frac{4}{5}$	8. $18\frac{7}{8}$	10. $35\frac{11}{12}$	12. $14\frac{7}{20}$

264. Reducing improper fractions to integers or mixed numbers.

1. How many half dollars does it take to make \$1?

Then how many dollars are there in 4 half dollars? in 7 half dollars? in 10? in 13?

2. Find the value in dollars of 8 quarter dollars; of $\$\frac{8}{4}$; of 9 quarter dollars; of $\$\frac{9}{4}$; of $\$\frac{12}{4}$; of $\$\frac{11}{4}$; of $\$\frac{15}{4}$.

3. What is the value of $\frac{4}{2}$? $\frac{5}{2}$? $\frac{9}{3}$? $\frac{8}{3}$? $\frac{12}{6}$? $\frac{15}{4}$?

The **value** of a fraction is the quotient of its numerator divided by its denominator.

4. Change to an integer: $\frac{6}{3}$; $\frac{10}{2}$; $\frac{15}{5}$; $\frac{12}{3}$; $\frac{20}{4}$.

5. Reduce to a mixed number: $\frac{7}{2}$; $\frac{10}{3}$; $\frac{13}{4}$; $\frac{14}{5}$; $\frac{17}{6}$; $\frac{21}{8}$.

6. Tell how to reduce an improper fraction to an integer or a mixed number.

EXERCISES

265. Reduce to an integer or to a mixed number:

1. $\frac{7}{3}$	4. $\frac{18}{6}$	7. $\frac{32}{4}$	10. $\frac{45}{8}$	13. $\frac{28}{5}$
2. $\frac{8}{2}$	5. $\frac{24}{5}$	8. $\frac{37}{10}$	11. $\frac{17}{2}$	14. $\frac{69}{10}$
3. $\frac{9}{4}$	6. $\frac{27}{8}$	9. $\frac{41}{6}$	12. $\frac{36}{4}$	15. $\frac{72}{12}$

WRITTEN EXERCISES

266. Reduce to an integer or a mixed number:

1. $\frac{56}{4}$	4. $\frac{91}{7}$	7. $\frac{127}{5}$	10. $\frac{268}{8}$	13. $\frac{432}{16}$
2. $\frac{68}{5}$	5. $\frac{79}{3}$	8. $\frac{153}{9}$	11. $\frac{284}{12}$	14. $\frac{535}{20}$
3. $\frac{86}{6}$	6. $\frac{98}{8}$	9. $\frac{136}{10}$	12. $\frac{351}{15}$	15. $\frac{753}{24}$

267. Adding and subtracting fractions.

1. Compare the denominators of $\frac{1}{3}$ and $\frac{3}{4}$; of $\frac{4}{12}$ and $\frac{9}{12}$. The fractions $\frac{4}{12}$ and $\frac{9}{12}$ have a **common denominator.**

2. What must be done to fractions that have different denominators before they can be added or subtracted?

3. Reduce $\frac{3}{4}$ and $\frac{1}{2}$ to fractions having a common denominator; $\frac{5}{6}$ and $\frac{1}{3}$; $\frac{1}{2}$ and $\frac{2}{3}$; $\frac{1}{6}$ and $\frac{1}{4}$.

Add $\frac{3}{4}$ and $\frac{1}{2}$; $\frac{5}{6}$ and $\frac{1}{3}$. Subtract $\frac{1}{2}$ from $\frac{2}{3}$; $\frac{1}{6}$ from $\frac{1}{4}$.

EXERCISES

268. Give answers:

1. $\frac{1}{2}+\frac{2}{3}$
2. $\frac{1}{3}+\frac{1}{4}$
3. $\frac{1}{2}-\frac{1}{8}$
4. $\frac{2}{3}-\frac{1}{4}$
5. $\frac{7}{8}-\frac{3}{4}$
6. $\frac{1}{6}+\frac{1}{3}$
7. $\frac{5}{6}-\frac{1}{2}$
8. $\frac{3}{4}+\frac{5}{6}$
9. $\frac{9}{10}-\frac{3}{5}$
10. $\frac{2}{3}+\frac{3}{2}+\frac{1}{3}$
11. $\frac{3}{4}-\frac{2}{3}+\frac{5}{4}$
12. $\frac{5}{6}+\frac{1}{4}-\frac{7}{12}$

13. Count by $2\frac{1}{2}$'s from 0 to 50, thus: "$2\frac{1}{2}$, 5, $7\frac{1}{2}$," etc. Count back by $2\frac{1}{2}$'s from 50 to 0 in this way: "50, $47\frac{1}{2}$, 45," etc.

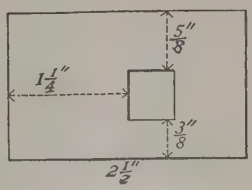
14. Count by $3\frac{1}{3}$'s from 0 to 50 and back; count by $4\frac{1}{5}$'s from 0 to 42 and back.

Add and subtract:

15. $7\frac{1}{3}$ / $5\frac{1}{2}$
16. $5\frac{1}{4}$ / $2\frac{3}{8}$
17. $6\frac{2}{3}$ / $4\frac{3}{4}$
18. $8\frac{3}{4}$ / $3\frac{5}{6}$
19. $9\frac{2}{5}$ / $6\frac{7}{10}$

20. If the hole in this iron plate is $\frac{1}{2}''$ square, how wide is the plate?

21. How far is the hole from the right end of the plate?



WRITTEN EXERCISES

269. 1. Add $\frac{3}{4}$, $\frac{2}{5}$, and $\frac{7}{10}$.

What must be done before these fractions can be added? Can they all be reduced to tenths? to twentieths? to fortieths?

$\frac{3}{4}+\frac{2}{5}+\frac{7}{10}=$

$\frac{15}{20}+\frac{8}{20}+\frac{14}{20}=\frac{37}{20}=1\frac{17}{20}$

Why is it better to reduce the fractions to twentieths than to fortieths?

By what number must the terms of $\frac{3}{4}$ be multiplied to reduce the fraction to twentieths? the terms of $\frac{2}{5}$? of $\frac{7}{10}$?

Observe that the *common denominator* is a multiple of each of the given denominators, 4, 5, and 10.

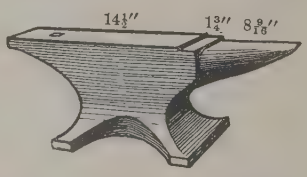
Do as the signs indicate:

2. $\frac{3}{4}-\frac{3}{5}$
3. $\frac{5}{6}+\frac{4}{5}$
4. $\frac{7}{8}-\frac{1}{6}$
5. $\frac{7}{12}+\frac{5}{8}$
6. $\frac{25}{24}-\frac{23}{48}$
7. $\frac{27}{50}+\frac{24}{25}$
8. $\frac{17}{20}-\frac{13}{30}$
9. $\frac{31}{50}+\frac{27}{20}$
10. $\frac{19}{20}-\frac{14}{25}$
11. $\frac{3}{4}+\frac{1}{2}+\frac{7}{8}$
12. $\frac{2}{3}-\frac{3}{5}+\frac{5}{6}$
13. $\frac{2}{5}+\frac{5}{8}-\frac{1}{4}$

Add and subtract:

14. $43\frac{1}{6}$ / $27\frac{3}{4}$
15. $36\frac{7}{12}$ / $19\frac{5}{6}$
16. $84\frac{3}{8}$ / $51\frac{7}{16}$
17. $75\frac{5}{12}$ / $38\frac{11}{24}$
18. $97\frac{13}{50}$ / $23\frac{21}{25}$

19. How long is this anvil?



20. The top is $3\frac{3}{4}$″ wide, and the square hole is $1\frac{5}{16}$″ from each side. How wide is the hole?

21. A 135-pound anvil after several years' use weighed $132\frac{5}{16}$ pounds. Find the loss of weight due to wear.

270. Finding parts of numbers.

EXERCISES

Find:

1. $\frac{3}{4}$ of 48
2. $\frac{4}{5}$ of 55
3. $\frac{5}{6}$ of 72
4. $\frac{3}{10}$ of 70
5. $\frac{7}{10}$ of 90
6. $\frac{5}{12}$ of 84
7. $\frac{3}{8}$ of 56
8. $\frac{5}{8}$ of 64
9. $\frac{7}{8}$ of 96
10. $\frac{9}{10}$ of 120
11. $\frac{7}{12}$ of 108
12. $\frac{11}{12}$ of 144
13. How many minutes are there in $\frac{5}{12}$ of an hour?
14. A boy who had 80 cents spent $\frac{9}{10}$ of it on the Fourth of July. How many cents did he spend?
15. How many quarts of oats had Mr. Gould fed his horse when he had fed him $\frac{7}{8}$ of a bushel?

WRITTEN EXERCISES

271. Find:

1. $\frac{3}{4}$ of \$2.68
2. $\frac{5}{6}$ of \$4.92
3. $\frac{3}{8}$ of \$6.88
4. $\frac{5}{8}$ of 392
5. $\frac{7}{10}$ of 860
6. $\frac{5}{12}$ of 948
7. $\frac{7}{8}$ of 4984
8. $\frac{7}{12}$ of 6396
9. $\frac{11}{12}$ of 8076
10. Find the cost of $\frac{3}{8}$ A. of land at \$136 A.
11. Mr. Harmon set out 228 tomato plants, and Mr. Gage $\frac{5}{6}$ as many. How many plants did Mr. Gage set out?
12. Find the cost of $\frac{4}{5}$ of a ton of coal at \$6.25 a ton.
13. A farmer stored 384 bushels of potatoes, and $\frac{5}{12}$ of them decayed. How many bushels decayed? How many did not decay?
14. I paid \$4632 for a house and sold it for $\frac{11}{12}$ of the cost. For how much did I sell it? How much did I lose?

272. Multiplying by a mixed number.

EXERCISES

Multiply:

1. 9 by $7\frac{1}{3}$
2. 8 by $9\frac{1}{4}$
3. 10 by $4\frac{1}{5}$
4. 12 by $5\frac{1}{6}$
5. 24 by $2\frac{1}{8}$
6. 15 by $3\frac{2}{3}$
7. 16 by $2\frac{3}{4}$
8. 20 by $3\frac{2}{5}$
9. Find the cost of $2\frac{1}{2}$ pounds of cheese @ 14¢.
10. When eggs are worth 20¢ a dozen, how much must be paid for $3\frac{1}{4}$ dozen?
11. Mr. Ford bought $2\frac{1}{8}$ bushels of corn at 40¢ a bushel. How much did the corn cost?

WRITTEN EXERCISES

273. Multiply:

1. 78 by $6\frac{2}{3}$
2. 84 by $9\frac{3}{4}$
3. 96 by $8\frac{5}{6}$
4. 225 by $47\frac{3}{5}$
5. 464 by $56\frac{5}{8}$
6. 680 by $89\frac{7}{10}$
7. 576 by $146\frac{3}{4}$
8. 768 by $325\frac{7}{8}$
9. 948 by $478\frac{5}{12}$

Find the cost of:

10. $12\frac{1}{2}$ gallons of vinegar @ \$.28.
11. $25\frac{3}{4}$ acres of land @ \$ 96.
12. $37\frac{4}{5}$ tons of hay @ \$ 15.50.
13. $44\frac{7}{8}$ yards of silk @ \$ 1.12.
14. A dressmaker bought a piece of velvet containing $24\frac{2}{3}$ yards at \$ 2.25 a yard. Find the cost.
15. If an express train runs at the rate of 48 miles an hour, how far will it run in $23\frac{7}{12}$ hours?

274. Finding the whole when one or more parts are given.

1. If 3 oranges cost 9 cents, how much will 1 orange cost? 4 oranges?

2. If 3 fourths of a cake cost 9 cents, how much will 1 fourth of it cost? 4 fourths, or the whole cake?

3. If $\frac{3}{4}$ of the cost of a top is 9 cents, how much is $\frac{1}{4}$ of the cost? $\frac{4}{4}$, or the whole cost?

4. If $\frac{3}{4}$ of a number is 9, what is $\frac{1}{4}$ of it? what is the number?

5. If $\frac{2}{5}$ of a number is 10, what is $\frac{1}{5}$ of it? what is the number? If $\frac{2}{3}$ of a number is 8, what is the number?

EXERCISES

275. 1. If $\frac{3}{5}$ of a number is 15, what is the number?

2. 12 is $\frac{2}{3}$ of what number?

3. 18 is $\frac{3}{4}$ of what number?

4. 20 is $\frac{5}{6}$ of what number?

5. 24 is $\frac{3}{8}$ of what number?

6. Helen spent $\frac{4}{5}$ of the money she had for a fan. If the fan cost 40 cents, how much money had she at first?

7. If $\frac{5}{8}$ of the number of pupils in the fourth grade are girls and there are 25 girls, how many pupils are there?

8. Find the cost of a pound of mustard, if $\frac{3}{4}$ of a pound costs 24 cents.

9. Mr. Hay bought $\frac{5}{8}$ of a bushel of corn for 30 cents. At that rate how much would a bushel cost?

10. Elmer weighs 55 pounds, and his weight is $\frac{11}{12}$ that of Henry. How much does Henry weigh?

WRITTEN EXERCISES

276. 1. Mr. Day has \$278 in the bank, and this is $\frac{2}{3}$ of all the money he has. How much money has he?

$$\begin{array}{r} 2)\$278 \\ \$139 \\ \times\ 3 \\ \hline \$417 \end{array}$$

$\frac{2}{3}$ of Mr. Day's money = \$278.
$\frac{1}{3}$ of his money = $\frac{1}{2}$ of \$278, or \$139.
His money = 3 times \$139, or \$417.

2. Find the cost of a horse, if $\frac{3}{4}$ of the cost was \$135.

3. How much is a ton of coal worth when $\frac{3}{5}$ T. costs \$3.75?

4. A man owning a mill offered to sell $\frac{5}{6}$ of his interest for \$7675. At that rate how much was the mill worth?

5. If $\frac{4}{5}$ of the cost of a farm was \$2964, find the cost.

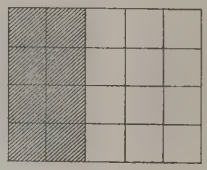
6. Mr. Stone paid \$2.25 for $\frac{3}{8}$ of a bushel of grass seed. How much was a bushel worth at the same rate?

7. If $\frac{5}{12}$ of the garrison of a fort received wounds and 385 soldiers were wounded, how many were in the fort?

277. Finding what part one number is of another.

1. What part of the whole oblong is 1 vertical column of squares? 2 columns?

How many squares are there in the oblong? how many are shaded? What part of the oblong is shaded?



Then 8 squares is what part of 20 squares?

8 is $\frac{8}{20}$, or $\frac{2}{5}$, of 20.

2. How many squares of the oblong are light? What part of the oblong is light? Then 12 is what part of 20?

12 is $\frac{12}{20}$, or $\frac{3}{5}$, of 20.

3. How many squares are there in 2 horizontal rows? What part of the oblong is 2 rows?

Then 10 is what part of 20?

4. What part of the oblong is 3 horizontal rows? Then 15 is what part of 20?

5. What part of 24 is 8? 9? 12? 16? 18? 20? 22?

EXERCISES

278. What part of:

1. 15 is 5?
2. 16 is 4?
3. 18 is 6?
4. 12 is 9?
5. 18 is 12?
6. 30 is 20?
7. 36 is 18?
8. 40 is 25?
9. 50 is 30?
10. 48 is 36?
11. 60 is 48?
12. 75 is 50?

13. What part of 100 is 10? 20? 25? 30? 40? 45? 50? 60? 70? 75? 80? 90?

14. What part of \$1 is 10¢? 20¢? 25¢? 50¢? 75¢?

15. Mr. Boyd feeds his horses 12 quarts of oats per day. What part of a bushel does he feed them each day?

16. What part of an hour is 15 minutes? 20 minutes? 30 minutes? 45 minutes?

17. Robert lives 80 rods from the schoolhouse. What part of a mile does he have to walk in going to school?

18. What part of an acre is there in a lot that is 10 rods long and 8 rods wide?

19. Mr. Gay bought 500 pounds of bran. What part of a ton did he buy? How much did it cost at \$16 a ton?

279. Finding the cost when the price can be expressed as an easy fraction of a dollar.

1. How much will 12 hats cost at \$1 each? at \$.50?

What part of \$1 is \$.50? Then what part of the cost of 12 hats at \$1 is the cost of the same number at \$.50?

An easy way to find the cost of 12 hats at \$.50 each is to find $\frac{1}{2}$ of the cost at \$1 each.

2. From the cost of 16 yards of cloth at \$1 a yard, find the cost at \$.25, or \$$\frac{1}{4}$, a yard; at \$1.25, or \$1 + \$$\frac{1}{4}$, a yard.

From the cost at \$$\frac{1}{4}$ a yard, find the cost at \$.75, or \$$\frac{3}{4}$, a yard.

3. What part of \$1 is \$.20? How much will 15 books cost at \$.20 each? at \$1.20 each?

EXERCISES

280. In a similar way find the cost of:

1. A dozen handkerchiefs at 25¢ each.
2. 24 towels at 50¢ each.
3. 40 napkins at 75¢ each.
4. 1 case of eggs (30 doz.) at 20¢ a dozen.
5. 44 yards of carpet at \$1.25 per yard.
6. 15 baskets of plums at 40¢ per basket.
7. 35 pounds of tea at 60¢ per pound.
8. 30 hammocks at \$1.20 each.
9. 14 yards of silk at \$1.50 per yard.
10. 25 pounds of choice candy at 40¢ per pound.
11. 70 gallons of maple sirup at \$1.10 per gallon.

WRITTEN EXERCISES

281. 1. Mr. Hopkins bought 236 bushels of oats at \$.25 a bushel. How much did they cost him?

$$4)\$236$$
$$\$59$$

At \$1 a bushel 236 bushels of oats would cost \$236. (\$.25 = \$$\frac{1}{4}$.)

At \$$\frac{1}{4}$ a bushel the oats cost $\frac{1}{4}$ of \$236, or \$59.

2. A grocer bought 400 pounds of butter at 25 cents per pound. Find the cost.

3. At a fair 3248 50-cent tickets were sold in one day. Find the gate receipts for that day.

4. A farmer sold a load of hops weighing 2880 pounds at \$.20 a pound. How much did he receive for them?

5. An orchard yielded 840 bushels of peaches. How much were they worth at \$1.50 per bushel?

6. How much will a boy earn in 28 days at \$.75 per day?

7. A car contained 175 barrels of apples. How much were they worth at \$1.40 per barrel?

8. A cargo of lemons consisting of 25,000 boxes was bought for \$1.60 per box. Find the cost of the cargo.

9. Thirty olive pickers and an overseer received \$50 a day. If each picker received \$1.50 per day, how much did the overseer receive?

10. Find the cost of this lot at \$.80 per square foot.

11. Find the cost of sending 30,000 pounds of oranges from California to New York at \$1.25 per hundredweight.

282. Comparing fractions.

1. Into how many small squares is the oblong divided?

What part of the oblong is each small square?

The oblong is also divided into *halves* and into *fourths*.

Point to $\frac{1}{8}$ of the oblong; to $\frac{1}{4}$ of it; to $\frac{1}{2}$ of it.

2. How many fourths are there in $\frac{1}{2}$?

Compare $\frac{1}{2}$ with $\frac{1}{4}$ in this way: "$\frac{1}{2}$ is 2 times $\frac{1}{4}$."

What part of $\frac{1}{2}$ is $\frac{1}{4}$?

Compare $\frac{1}{4}$ and $\frac{1}{2}$ in this way: "$\frac{1}{4}$ is $\frac{1}{2}$ of $\frac{1}{2}$."

3. How many eighths are there in $\frac{1}{2}$? What part of $\frac{1}{2}$ is $\frac{1}{8}$?

$\frac{1}{2}$ is —— times $\frac{1}{8}$. $\frac{1}{8}$ is —— of $\frac{1}{2}$.

4. How many eighths are there in $\frac{1}{4}$? What part of $\frac{1}{4}$ is $\frac{1}{8}$? Compare $\frac{1}{4}$ with $\frac{1}{8}$; $\frac{1}{8}$ with $\frac{1}{4}$.

EXERCISES

283. By observing this oblong compare:

1. $\frac{1}{2}$ with $\frac{1}{10}$
2. $\frac{1}{10}$ with $\frac{1}{2}$
3. $\frac{1}{5}$ with $\frac{1}{10}$
4. $\frac{1}{10}$ with $\frac{1}{5}$

Draw oblongs, and by dividing them properly, compare:

5. $\frac{1}{2}$ with $\frac{1}{6}$
6. $\frac{1}{6}$ with $\frac{1}{2}$
7. $\frac{1}{3}$ with $\frac{1}{6}$
8. $\frac{1}{6}$ with $\frac{1}{3}$
9. $\frac{1}{2}$ with $\frac{1}{12}$
10. $\frac{1}{12}$ with $\frac{1}{2}$
11. $\frac{1}{3}$ with $\frac{1}{12}$
12. $\frac{1}{12}$ with $\frac{1}{3}$
13. $\frac{1}{4}$ with $\frac{1}{12}$
14. $\frac{1}{12}$ with $\frac{1}{4}$
15. $\frac{1}{6}$ with $\frac{1}{12}$
16. $\frac{1}{12}$ with $\frac{1}{6}$

DIVISION

EXERCISES

284. Give quotients at sight:

1. $48 \div 3$	5. $42 \div 14$	9. $99 \div 11$	13. $72 \div 6$
2. $63 \div 7$	6. $88 \div 11$	10. $84 \div 12$	14. $30 \div 15$
3. $50 \div 2$	7. $34 \div 17$	11. $26 \div 13$	15. $28 \div 14$
4. $32 \div 8$	8. $60 \div 12$	12. $32 \div 16$	16. $39 \div 13$

17. Write "72 divided by 8" in these three ways:

(1) Use the division sign, $\div$.
(2) Use a curved line between 8 and 72.
(3) Use a fraction whose terms are 72 and 8.

Read, using the words "divided by"; answer carefully:

18. $\frac{140}{7} =$	23. 12 in.)96 in.	28. $\frac{45 \text{ ft.}}{3}$
19. 140 bu. $\div 7 =$	24. 12)132 ft.	
20. 7)140 days	25. 108 in. $\div 12 =$	29. $\frac{45 \text{ ft.}}{3 \text{ ft.}}$
21. 7 da.)140 da.	26. 144 in. $\div$ 12 in. $=$	
22. $120¢ \div 40¢ =$	27. 48 oz. $\div$ 16 oz. $=$	30. $\frac{72 \text{ pk.}}{8 \text{ pk.}}$

Answer carefully, reading across the page:

31. 3)6 yd. + 1 yd.	3)7 yd.	4)13 gal.
2 yd. + $\frac{1}{3}$ yd.	— yd.	— gal.
32. 4 qt.)8 qt. + 1 qt.	4 qt.)9 qt.	\$5)\$22
2 + $\frac{1}{4}$		

33. We find $\frac{1}{4}$ of 17 pecks by dividing 17 pecks by 4.

$$4\overline{)17 \text{ pk.}}$$
$$\text{— pk.}$$

34. We find how many times 17 pecks contains 4 pecks by dividing 17 by 4.

$$4 \text{ pk.})\overline{17 \text{ pk.}}$$
$$\text{——}$$

Tell what each indicated division means; then answer:

35. $2\overline{)27 \text{ qt.}}$

36. $4\overline{)39 \text{ bu.}}$

37. $5\overline{)41 \text{ mi.}}$

38. $16\overline{)36 \text{ lb.}}$

39. $2 \text{ pt.})\overline{31 \text{ pt.}}$

40. $4 \text{ pk.})\overline{50 \text{ pk.}}$

41. $3 \text{ ft.})\overline{62 \text{ ft.}}$

42. $12 \text{ in.})\overline{30 \text{ in.}}$

43. $\frac{\$47}{2}$, $\frac{\$47}{\$2}$

44. 420 min. $\div$ 60

45. 300 sec. $\div$ 60 sec.

Find the cost of 1 article at the rate of:

46. 3 for 25¢

47. 4 for 25¢

48. 8 for 50¢

49. 8 for $1

50. 3 for 50¢

51. 12 for $1

WRITTEN EXERCISES

285. 1. Reduce 101 in. to feet and inches; 75 in. to feet.

Solutions

$$12 \text{ in.})\overline{101 \text{ in.}}$$
$$8, 5 \text{ in. remainder}$$
$$101 \text{ in.} = 8 \text{ ft. } 5 \text{ in.}$$

$$12 \text{ in.})\overline{75 \text{ in.}}$$
$$6\tfrac{3}{12}$$
$$75 \text{ in.} = 6\tfrac{3}{12} \text{ ft.} = 6\tfrac{1}{4} \text{ ft.}$$

Reduce:

2. 46 ft. to yd. and ft.

3. 95 qt. to gal. and qt.

4. 220 min. to hr. and min

5. 200 in. to ft.

6. 110 pk. to bu.

7. 134 qt. to gal.

Reduce:

8. 125 qt. to pk. and qt.
9. 177 mo. to yr. and mo.
10. 1000 oz. to lb. and oz.
11. 110 ft. to yd.
12. 126 qt. to pk.
13. 156 hr. to da.

14. If a train runs 500 miles in 12 hours, how many miles does it run per hour?

15. A barrel of flour weighs 196 pounds. How much does a quarter of a barrel of flour weigh?

Find the weight of $\frac{1}{8}$ barrel of flour.

16. $1|00\overline{)75|60}$ $\quad 75\frac{60}{100} = 75\frac{3}{5}$

17. $2|00\overline{)8|40}$ $\quad 4\frac{40}{200} = 4\frac{1}{5}$

18. $2|00\overline{)9|60}$ $\quad 4\frac{160}{200} = 4\frac{4}{5}$

Divide:

19. 570 by 100
20. 350 by 100
21. 720 by 100
22. 2440 by 100
23. 420 by 200
24. 960 by 200
25. 1200 by 500
26. 1500 by 800
27. $1250 by 1000
28. $7500 by 3000
29. 5000 T. by 2000
30. 2500 lb. by 2000 lb.

Reduce:

31. 210 sec. to minutes.
32. 440 min. to hours.
33. 500 sq. rd. to acres.
34. 1800 rd. to miles.
35. 2840 lb. to cwt.
36. 5500 lb. to tons.

37. Express 875¢ as dollars and cents.

38. Find the cost of 3000 lb. of hay at $12.50 per ton.

39. Find the value of a farm 120 rods long and 110 rods wide at $56 an acre.

WRITTEN EXERCISES

286. 1. Divide 4572 by 48.

$$\begin{array}{r} 95\frac{1}{4} \\ 48\overline{)4572} \\ \underline{432} \\ 252 \\ \underline{240} \\ 12 \end{array}$$

$4572 \div 48 = 95$, with a remainder of 12.

$12 \div 48 = \frac{12}{48} = \frac{1}{4}$.

The quotient is $95\frac{1}{4}$.

Test the answer by multiplying 48 by $94\frac{1}{4}$.

Divide and test:

2. $1737 \div 18$
3. $4319 \div 56$
4. $6226 \div 66$
5. $2976 \div 36$
6. $1356 \div 32$
7. $2922 \div 54$
8. $5848 \div 72$
9. $1652 \div 24$
10. $1534 \div 16$
11. $3900 \div 84$
12. $2676 \div 132$
13. $5388 \div 144$

14. If 28 boys weigh 2114 pounds, what is their average weight?

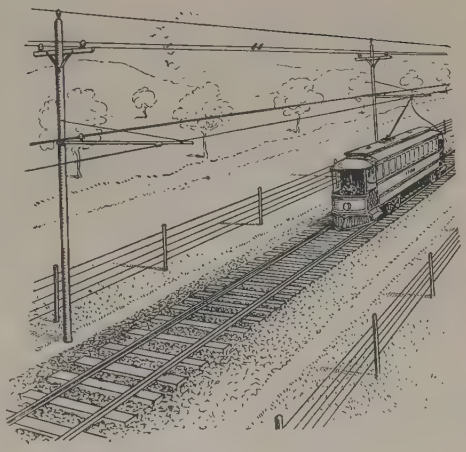
15. A bushel of wheat weighs 60 pounds. How many bushels of wheat are there in a car that contains 37,545 pounds of wheat?

Divide:

16. 189,175 by 235
17. 407,886 by 471
18. 288,750 by 750
19. 166,957 by 427
20. 311,812 by 548
21. 389,672 by 536
22. 406,224 by 496
23. 727,155 by 585
24. 555,111 by 333
25. 780,781 by 409

WRITTEN EXERCISES

287. This electric railway connects two towns 7 miles apart.



1. If the cars run from one town to the other in 15 minutes, how many miles per hour do they run?

2. Each steel rail is 30 feet long and weighs 65 pounds per yard. How much does 1 rail weigh?

3. Find the cost of all the rails at $28 per long ton.

4. The ties are 10 inches wide and the spaces between them 14 inches wide. How many are there per mile?

5. Find the cost of ties for a mile of track at 60¢ each.

6. There are 44 poles for every mile of track. How many feet apart are the poles?

7. Find the cost of all the poles at $2.75 each.

8. How many posts 1 rod apart are required for both fences? Find their cost at 18¢ each.

9. How many pounds of wire are required for both fences, if 15 feet of wire weigh a pound?

10. The copper trolley wire weighs 2128 pounds per mile. Find its cost at 16¢ per pound.

DECIMAL FRACTIONS

288. 1. When anything is divided into 10 equal parts, what is each part called?

One tenth may be written in these two ways: $\frac{1}{10}$ and .1.

The period before the figure 1 is called the **decimal point**.

Read: $\frac{3}{10}$; .3; $\frac{5}{10}$; .5; .6; .9; .8.

Write in two ways: 2 tenths; 4 tenths; 7 tenths.

2. If each tenth of anything is divided into 10 equal parts, into how many equal parts will the whole thing be divided?

When anything is divided into 100 equal parts, what is each part called?

One hundredth may be written in these two ways: $\frac{1}{100}$ and .01.

Read: $\frac{3}{100}$; .03; $\frac{7}{100}$; .07; $\frac{25}{100}$; .25; $\frac{50}{100}$; .50; .37; .06; .18; .45; .09; .75.

Write in two ways: 8 hundredths; 15 hundredths; 35 hundredths; 4 hundredths; 62 hundredths.

3. If each hundredth of anything is divided into 10 equal parts, into how many equal parts will the whole thing be divided?

When anything is divided into 1000 equal parts, what is each part called?

One thousandth may be written in two ways: $\frac{1}{1000}$ and .001.

Read: $\frac{3}{1000}$; .003; $\frac{19}{1000}$; .019; $\frac{225}{1000}$; .225; .007; .045; .372; .608; .250; .009; .075.

Write in two ways: 5 thousandths; 25 thousandths;

452 thousandths; 8 thousandths; 50 thousandths; 86 thousandths; 999 thousandths.

4. How many thousandths are there in 1 hundredth? hundredths in 1 tenth? tenths in 1 unit?

Fractions that express tenths, hundredths, thousandths, etc., are called **decimal fractions**, or **decimals**.

Other fractions are called **common fractions**.

5. Read these decimals:

.1	.01	.001	.111
.3	.03	.003	.333

How many figures are needed to express tenths? hundredths? thousandths?

What does 1 mean when it stands in the first place at the right of the decimal point? in the second place? in the third?

What does 3 mean when it stands in tenths' place? in hundredths' place? in thousandths' place?

6. One *and* 1 tenth may be written, 1.1; 1 *and* 1 hundredth, 1.01; 1 *and* 1 thousandth, 1.001.

Write: 5 and 7 tenths; 23 and 9 hundredths; 247 and 139 thousandths; 4 and 56 hundredths; 17 and 8 thousandths; 9 and 24 thousandths.

Read, using the word *and* between the integer and the decimal, but not elsewhere: 3.4; 5.9; 8.25; 19.07; 6.146; 25.037; 30.002.

7. A number expressed by an integer and a decimal is called a **mixed number**, or a **mixed decimal**

EXERCISES

289. Read:

1. .5	4. .04	7. .325	10. 6.4
2. .8	5. .85	8. .032	11. 3.08
3. .24	6. .005	9. .430	12. 7.875

Write each of the following in another form:

13. $\frac{9}{10}$	16. .11	19. .27	22. $\frac{225}{1000}$
14. $\frac{9}{100}$	17. .011	20. .016	23. $4\frac{33}{100}$
15. $\frac{9}{1000}$	18. .111	21. .375	24. $3\frac{7}{1000}$

Write as decimals:

25. 6 tenths; 2 hundredths; 3 thousandths.

26. 12 and 25 hundredths; 14 and 125 thousandths.

27. 100 and 4 hundredths; 1000 and 1 thousandth.

290. Reducing decimals to common fractions.

WRITTEN EXERCISES

1. Reduce .2 to a common fraction; also .75.

$.2 = \frac{2}{10} = \frac{1}{5}$ $.75 = \frac{75}{100} = \frac{3}{4}$

Reduce to a common fraction in its lowest terms:

2. .4	8. .60	14. .06	20. .005
3. .6	9. .80	15. .200	21. .250
4. .8	10. .50	16. .500	22. .025
5. .20	11. .32	17. .020	23. .750
6. .25	12. .05	18. .050	24. .400
7. .40	13. .04	19. .002	25. .800

291. Reducing common fractions to decimals.

EXERCISES

1. Reduce $\frac{1}{2}$ to a decimal; also $\frac{18}{60}$.

$\frac{1}{2} = \frac{5}{10} = .5$ $\frac{18}{60} = \frac{3}{10} = .3$

Reduce to tenths and write as a decimal:

2. $\frac{1}{5}$ 4. $\frac{4}{5}$ 6. $\frac{12}{30}$ 8. $\frac{30}{50}$

3. $\frac{3}{5}$ 5. $\frac{6}{20}$ 7. $\frac{28}{40}$ 9. $\frac{35}{50}$

Reduce to hundredths and write as a decimal:

10. $\frac{1}{2}$ 12. $\frac{1}{4}$ 14. $\frac{4}{50}$ 16. $\frac{16}{200}$

11. $\frac{1}{5}$ 13. $\frac{3}{4}$ 15. $\frac{3}{25}$ 17. $\frac{60}{500}$

Reduce to thousandths and write as a decimal:

18. $\frac{1}{2}$ 20. $\frac{3}{5}$ 22. $\frac{3}{200}$ 24. $\frac{126}{2000}$

19. $\frac{1}{5}$ 21. $\frac{1}{4}$ 23. $\frac{7}{50}$ 25. $\frac{48}{3000}$

292. Adding and subtracting decimal fractions.

WRITTEN EXERCISES

1. Add 1.125, 4.27, and 6.075.

$$\begin{array}{r} 1.125 \\ 4.27 \\ 6.075 \\ \hline 11.47 \end{array}$$

Units are written in one column, tenths in another, etc. When this is done, *the decimal points stand in a column.*

Adding and placing the decimal point under the other decimal points, the sum found is 11.470; but since $\frac{470}{1000} = \frac{47}{100}$, we write 11.47.

Add:

2. 4.7 and 3.8
3. 6.75 and 2.63
4. 4.235, 6.41, 2.567
5. 3.625, 1.05, 3.385
6. 24.63, 0.75, 61.006
7. 45, 3.5, 10.05
8. 3.6, 4.82, 5.756
9. 34.704, .436, 2.47
10. 17.205, .495, 3.7
11. 3.3, 4.03, 6.003, .667

12. Subtract 2.34 from 5.8.

$$\begin{array}{r} 5.80 \\ 2.34 \\ \hline 3.46 \end{array}$$

The minuend 5.8 has fewer decimal places than the subtrahend 2.34. But since $\frac{8}{10} = \frac{80}{100}$, the minuend may be written 5.80.

Subtract:

13. 1.56 from 2.5
14. 7.405 from 9.64
15. 3.822 from 25.4
16. 5.218 from 6.434
17. From 10 subtract: 7.5; 2.5; 6.67; 1.625.
18. From 100 subtract: 4.8; 44.8; 63.75; 33.33.

Add or subtract as indicated:

19. 3.1 ft. + 2.48 ft.
20. 6.75 in. − 4.37 in.
21. 28.72 yd. + 3.58 yd.
22. 1.1 gal. + 99.9 gal.
23. 10 in. − 4.75 in.
24. 3.205 A. + 4.375 A.

25. A man who had a farm of 120.75 acres sold 44.37 acres of it. How many acres had he left?

26. Edward rode 439.4 miles on the train in going from New York to Buffalo, and 535.9 miles in going from Buffalo to Chicago. How many miles did he ride?

BILLS

293. 1. Mr. Charles H. Thompson bought the following articles at Mr. A. B. McLaurin's grocery store:

Apr. 20, 5 lb. of butter @ $.27;
Apr. 21, 3 qt. of beans @ $.06,
and 2 pk. of potatoes @ $.25;
Apr. 24, 3 doz. oranges @ $.35.

How much did Mr. Thompson owe the grocer for butter? for beans? for potatoes? for oranges? for all?

2. When Mr. Thompson bought the oranges he asked how much he owed. The grocer then made this **bill**:

New York, *Apr. 24*, 1906.

Mr. *Chas. H. Thompson*,
385 E. Sixteenth St.

Bought of A. B. McLAURIN, 205 Third Ave.
Dealer in Staple and Fancy Groceries.

TERMS: *Cash.*

Apr.	*20*	*5 lb. butter*	*.27*	*1*	*35*		
"	*21*	*3 qt. beans*	*.06*		*18*		
"	"	*2 pk. potatoes*	*.25*		*50*		
"	*24*	*3 doz. oranges*	*.35*	*1*	*05*	*3*	*08*
		Received payment,					
		A. B. McLaurin.					

Find whether $3.08 was the correct amount, or **footing**.

3. When the bill was paid, Mr. McLaurin **receipted** it by writing below it, "Received payment" and his name.

WRITTEN EXERCISES

294. Suppose that you own a store and have sold the following goods to several customers (your classmates or others). Make out a bill to each, and present it for payment. If found correct, and paid, receipt it.

1. 2 pairs of scissors @ 75¢; 16 papers of tacks @ 4¢; 4 planes @ 80¢; 3 hammers @ 65¢.

2. 3 chisels @ 45¢; 2 screwdrivers @ 55¢; 4 augers, 11¢, 14¢, 17¢, 20¢; 6 bits @ 20¢.

3. 3 wrenches @ 25¢; 2 pairs of pliers @ 45¢; 8 dozen bolts @ 24¢; 2 lawn mowers @ $4.75.

4. 2 tents @ $8.25; 4 rubber blankets @ $2.75; 2 camp stoves @ $5.50.

5. 2 fishing rods, $2.50; 2 reels, 75¢; 100 yd. fish line @ 40¢ per 25 yd.; 5 doz. trout flies @ 35¢.

Make out and foot bills for the following sales:

The seller may be a merchant known to you; the buyer, one of your classmates.

6. 5 doz. oranges @ 35¢; 8 doz. bananas @ 15¢; 12 qt. peanuts @ 5¢.

7. 9 collars @ 15¢; 6 pairs cuffs @ 25¢; 4 ties @ 50¢; 6 shirts @ $1.50; 18 handkerchiefs @ 20¢.

8. 1 couch @ $25; 6 chairs @ $1.75; 6 chairs @ $4.25.

9. 3 hoes @ 25¢; 2 rakes @ 35¢; 1 spade, 75¢; 2 shovels @ 65¢; 75 ft. hose @ 15¢.

10. 85 yd. carpet @ $1.25; 24 yd. linoleum @ $1.35.

In case of Loss return
to

Mrs. Elizabeth Ellis
Mr. Elmer. Ellis
Louisville
Colorado